## RENOVATIONS FOR FIVE (5) PRE-K CLASSROOMS AT CLAYTON J. DAVENPORT ELEMENTARY SCHOOL

## EGG HARBOR TOWNSHIP SCHOOL DISTRICT

EGG HARBOR TOWNSHIP - ATLANTIC COUNTY - NEW JERSEY



FVHD PROJECT #5481

Gillan and Hartmann, Inc. Consulting MEP Engineers

November 1, 2024

## <u>SPECIFICATIONS</u>

for **RENOVATIONS FOR FIVE (5) PRE-K CLASSROOMS AT CLAYTON J. DAVENPORT ELEMENTARY SCHOOL** 2501 Spruce Avenue, Egg Harbor Township, NJ 08234

# for the EGG HARBOR TOWNSHIP SCHOOL DISTRICT

Egg Harbor Township, Atlantic County, New Jersey

### FVHD PROJECT NO. 5481

### FRAYTAK VEISZ HOPKINS DUTHIE, P.C.

Architects – Planners 1515 Lower Ferry Road, Trenton, NJ 08618 Tel: 609.883.7101 - Fax: 609.883.2694

William D. Hopkins, III, AIA, LEED AP License No. 21AI01706000

## GILLAN & HARTMANN, INC.

#### **Consulting MEP Engineers**

140 Whitaker Avenue, Suite 300 Mont Clare, PA 19453

M. Steven Gillan, P.E. License No. 24GE4470000

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#### NOTICE TO BIDDERS Egg Harbor Township School District Atlantic County, New Jersey

<u>NOTICE IS HEREBY GIVEN</u> that the Egg Harbor Township Board of Education ("Owner") will receive bids for **Renovations for Five (5) Pre-K Classrooms at Clayton J. Davenport School,** together with all work incidental thereto, in accordance with the requirements of the Bid Documents prepared by Fraytak Veisz Hopkins Duthie, P.C. (FVHD), Architects-Planners, <u>www.fvhdpc.com</u>, **FVHD Project #5481**.

Bids will be received for: Single Overall Contract (DPMC: C009 with C029, C030, C032, C047)

<u>Bid Documents</u> for the proposed Work are on file at the office of the Architect, Fraytak Veisz Hopkins Duthie, P.C., 1515 Lower Ferry Road, Trenton, NJ 08618, tel. 609.883.7101. Bid Documents are available for no fee electronically from the Architect's website at <u>https://www.fvhdpc.com/contractors/bidlisting</u>. Requests for electronic project documentation must be made through a registered account via the FVHD Contractor Portal at <u>https://www.fvhdpc.com/contractors</u>.

<u>Prebid Meeting</u> is scheduled for **Wednesday, November 13, 2024, 9:00 AM.** Meet at Clayton J. Davenport School Main Entrance, 2501 Spruce Ave., Egg Harbor Township, NJ 08234. Attendance at the prebid meeting is optional but encouraged.

<u>All Requests for Information</u> (RFI) must be submitted in writing by **November 22, 2024**, and sent to <u>info@fvhdpc.com</u>, or fax to 609-883-2694 or via common carrier to the Architect at address indicated above. All correspondence must include the Architect Project Name and Project Number referenced. The Architect is not responsible for misdirected or misrouted correspondence. A direct shipping account number (FedEx or UPS) and preferred shipping speed must also be provided.

<u>Sealed Bids are due</u> by **Tuesday, December 10, 2024, 2:00 PM** to Egg Harbor Township Board of Education, Attn.: Daniel Smith, 13 Swift Drive, Egg Harbor Township, NJ 08234. Bids will be publicly opened and read immediately thereafter. Any Bid received after that time shall be rejected.

<u>Bid Proposal</u> shall be submitted in <u>duplicate</u> (one original and one copy) in a sealed envelope, addressed to the Owner, bearing the name and address of the Bidder, and clearly marked "BID" with the Contract title and/or bid number on the outside of the envelope and must be accompanied by a Certified Check, Cashier's Check or Bid Bond drawn to the order of the Owner in the amount of ten percent (10%) of the amount of the bid, but in no case in excess of \$20,000; and must be delivered to the above place on or before the hour named. The Board of Education and the Architect assume no responsibility for bids mailed or misdirected in delivery.

If the bid exceeds \$20,000 bidder must be pre-qualified by the New Jersey Division of Property Management and Construction (DPMC), in the above-listed classifications prior to the date that bids are received. Any bid submitted under the terms of New Jersey statutes not including a copy of a valid and active Pre-qualification/ Classification Certificate shall be rejected as being non-responsive to bid requirements.

Pursuant to <u>N.J.S.A.</u> 18A:18A-25, each proposal shall be accompanied by a Consent of Surety from a Surety Company stating it will provide each Bidder with separate Performance and Payment Bonds, each in the amount of 100% of the Contract sum. Also, Surety agrees to furnish Bidder with a Maintenance Bond in required form. The Consent of Surety shall be executed by an approved Surety company authorized to do business in the State of New Jersey and in accordance with <u>N.J.S.A.</u> 2A:44-143, and 2A:44-144 and with AM BEST rating of A- or better companies nationally recognized.

The project is being financed in part through Grants received under the Educational Facilities Construction and Financing Act, <u>N.J.S.A.</u> 18A:7G-1 et seq. (the "Act). Accordingly, all Bidders will be required to comply with the requirements of the Act as it pertains to them and to assist the School District in providing information and access to facilities as required in the Grant Agreements. The construction Contract will contain language required by the Grant Agreements. The Contractor will be

required to provide information to the School District, the Schools Development Authority and others that will enable the School District to receive the disbursements of the Grants.

The bidder and all its Subcontractors named in the branches specified in <u>N.J.S.A.</u> 18A:18A-18 who will perform work on the School Facilities Project must be prequalified prior to the submission of any bids pursuant to the School Development Authority prequalification process <u>N.J.S.A.</u> 18A:7G-41 unless the Contract is in an amount less that the bid threshold pursuant to <u>N.J.S.A.</u> 18A:18A-3.

This project is subject to the New Jersey State Prevailing Wage Act, <u>N.J.S.A.</u> 34:11-56.27 et seq. All bidders must comply with <u>N.J.S.A.</u> 10:5-31 et seq., <u>N.J.A.C.</u> 17:27 et seq. and N.J.S.A. 10:2-1. An Initial Project Workforce Report will be required from the successful Bidder (Form AA-201).

Pursuant to "The Public Works Contractor Registration Act", <u>N.J.S.A</u>. 34:11-56.48 et seq., Bidders and their Subcontractors are required to be registered with the New Jersey Department of Labor and Workforce Development and to possess a current certificate by said Department indicating compliance with the Act prior to the time and date that bids are received.

No bidder who is on the State Treasurer's or the Federal Government's List of Debarred, Suspended or Disqualified Bidders shall be eligible to bid on this project.

Per <u>N.J.S.A</u>. 52:32-44(b) all Contractors and Subcontractors must provide a Business Registration Certificate prior to Contract award.

No bid may be withdrawn for a period of sixty (60) days after the date set for the opening thereof. The right is reserved to reject all bids pursuant to <u>N.J.S.A</u>. 18A:18A-22 and to waive minor informalities in the bidding in accordance with applicable law.

Egg Harbor Township Board of Education Daniel Smith, Business Administrator/Board Secretary

#### **BIDDING INFORMATION**

#### **SECTION 00100 - INSTRUCTIONS TO BIDDERS**

#### 1.1 INVITATION TO BID

- A. All Bidders are required to prepare bids in accordance with all Drawings and Specifications (Bid Documents) prepared by Fraytak Veisz Hopkins Duthie, P.C. Architects-Planners.
  - 1. Access to Bid Documents:
    - a. Requests for electronic project documentation must be made through a registered account via FVHD Architect's Contractor Portal. If you have not already done so, please visit https://www.fvhdpc.com/contractors to register.
    - b. To obtain Bid Documents, you must create/register a Contractor account on the Architect's website and submit a request for Bid Documents at https://www.fvhdpc.com/contractors/bidlisting
- B. **DISCLAIMER**: Bidders should only rely on original digital and paper versions of the Bid Documents obtained directly from the Architect's office. Fraytak Veisz Hopkins Duthie, PC (FVHD) Architects-Planners is not responsible for any unauthorized copies made of the digital or paper Bid Documents obtained from sources other than the Architect's office. All information provided by Fraytak Veisz Hopkins Duthie, PC (FVHD) Architects-Planners is intellectual property and is protected under copyright laws. It is not to be used for any purpose other than for the indicated project. Any other use or manipulation of the information is strictly prohibited.
- C. Bids for Contract(s), as listed in the Advertisement for Bids or Invitation to Bid as hereinafter described, will be received for the performance of the Project. The bids shall cover all costs of any nature, incident to and growing out of the Work. In explanation but not in limitation thereof, these costs shall include the cost of all Work, labor, materials, equipment, transportation and cost of all else necessary to perform and complete the Project in the manner and within the time required, all incidental expenses in connection therewith, all costs on account of loss by damage or destruction of the Project caused by the Contractor, or Contractor's Agent, to the extent that the cost of such loss is not recovered from insurance carried by the Owner and the Contractor, and any additional expenses for unforeseen difficulties encountered, for settlement of damages and for replacement of defective Work and materials.
- D. Before submitting a Bid, the Bidder shall become familiar with the Drawings, Specifications and other documents that will form the Contract, shall investigate the site of the Project (not mandatory) and make such examination thereof as may be necessary to determine the character and amount of Work involved. The Bidder shall also determine that they can secure the necessary labor and equipment and that the materials proposed to use will comply with the requirements specified therefore and can be obtained by the Bidder in the quantities and at the time required.

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## Site visit(s) can be arranged upon request by contacting the Architect (not mandatory): (<u>thopkins@fvhdpc.com</u> / <u>jdubowitch@fvhdpc.com</u> / <u>info@fvhdpc.com</u>).

E. The Owner reserves the right to accept or reject all bids including Alternate Bids, if any, pursuant to applicable law under any Contract for a period up to sixty (60) days after receipt of bids.

## 1.2 ETHICS IN PURCHASING

- A. School District Responsibility
  - 1. Recommendation of Purchases
    - a. It is the desire of the Board of Education to have all Board employees and officials practice exemplary ethical behavior in the procurement of goods, materials, supplies, and services.
    - b. School district officials and employees who recommend purchases shall not extend any favoritism to any vendor. Each recommended purchase should be based upon quality of the items, service, price, delivery, and other applicable factors in full compliance with <u>N.J.S.A.</u> 18A:18A-26 et seq.
    - c. Solicitation/Receipt of Gifts Prohibited:
      - 1) School district officials and employees are prohibited from soliciting and receiving funds, gifts, materials, goods, services, favors, and any other items of value from vendors doing business with the Board of Education or anyone proposing to do business with the Board of Education.
  - 2. Vendor Responsibility:
    - a. Offer of Gifts, Gratuities -- Prohibited
      - 1) Any vendor doing business or proposing to do business with the Board of Education, shall neither pay, offer to pay, either directly or indirectly, any fee, commission, or compensation, nor offer any gift, gratuity, or other thing of value of any kind to any official or employee of the Board of Education or to any member of the official's or employee's immediate family.
    - b. Vendor Influence Prohibited:
      - 1) No vendor shall cause to influence or attempt to cause to influence, any official or employee of the Board of Education, in any manner which might tend to impair the objectivity or independence of judgment of said official or employee.
  - 3. Vendor Certification:
    - a. Vendors or potential vendors will be asked to certify that no official or employee of the Board of Education or immediate family members are directly or indirectly interested in this request or have any interest in any portions of profits thereof. The vendor participating in this request must be an independent vendor and not an official or employee of the Board of Education.

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## 1.3 **OBLIGATION OF BIDDER**

- A. At the time of the opening of bids, each Bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Drawings, Specifications and all other Bid Documents, including all Addenda and Bulletins. The failure or omission of any Bidder to receive or examine any form, instrument or document shall not relieve Bidder from any obligation with respect to their bid. It is recommended the Bidders visit the site and acquaint themselves with the existing conditions.
- B. Any and all discrepancies between the Drawings and Specifications or between trades shall be brought to the attention of the Architect prior to the Contractor's bid submission.

## 1.4 CHALLENGES TO BID SPECIFICATIONS (<u>N.J.S.A.</u> 18A:18A-15)

A. Any prospective Bidder who wishes to challenge a bid Specification shall file such challenges in writing with the School Business Administrator/Board Secretary no less than three (3) business days prior to the opening of bids. Challenges filed after that date shall be considered void and having no impact on the Board of Education or the award of a Contract.

## 1.5 NOTICE OF CLASSIFICATION OF BIDDERS (CONTRACTORS AND SUBCONTRACTORS)

- A. Pursuant to N.J.S.A. 18A:18A-26 et seq., as amended, and N.J.A.C. 17:19-2.1 through N.J.A.C. 17:19-2.7, Bidders on any Contract on public work for a Board of Education (Owner) in the State of New Jersey in which the entire cost of the Contract exceeds \$20,000.00, must have a classification from the Division of Property Management and Construction (DPMC), as to character and amount of public work on which they may submit bids. Bidder must submit, a "Notice of Classification" setting forth the type of Work and the amount of Work for which the Bidder has been qualified, that there has been no material adverse change in their qualification information, the total amount of uncompleted work on Contracts at the time and the date of the bid due date. Any Bidder who does not possess a valid and active "Notice of Classification" shall be ineligible to bid on this Project, and any bid submitted by such Bidder shall be rejected as non-responsive. (Forms for this purpose are available from the Director of the Division of Property Management and Construction DPMC, Trenton, New Jersey 08625.)
  - 1. Each classified Bidder's aggregate rating shall be calculated in accordance with formula prescribed by <u>N.J.A.C.</u> 17:19-2.8.
    - a. Calculations shall be based on Bidder's base bid amount at time of bid or total amount of base bid and accepted Alternate Bids at time of Award.

- B. In accordance with <u>N.J.S.A.</u> 34:11-56.48 et seq. and <u>N.J.S.A.</u> 18A:7G-37, each Bidder must be properly registered with the New Jersey Department of Labor and Workforce Development at the time of the bid. The Contractor shall enter into subcontracts only with Subcontractors who are registered pursuant to <u>N.J.S.A.</u> 34:11-56.48 et seq.
  - No Contractor/Subcontractor will be permitted to bid on or engage in any Contract for public work, as defined in the "New Jersey Prevailing Wage Act," <u>N.J.S.A.</u> 34:11-56.26 et seq., unless that Contractor / Subcontractor is registered with the New Jersey Department of Labor and Workforce Development at the time of the bid.
- C. The Owner may make such additional investigations as it deems necessary to determine the ability of the Bidder to perform the Work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. Pursuant to <u>N.J.S.A.</u> 18A:18A-31, "where there have been developments subsequent to the qualifications and classification of a Bidder which in the opinion of the Owner would affect the responsibility of the Bidder, information to that effect shall forthwith be transmitted to the department for its review and reconsideration of the classification. Before taking final action on any such bid, the Owner concerned shall notify the Bidder and give him an opportunity to present to the department any additional information which might tend to substantiate the existing classification."

## 1.6 TOTAL AMOUNT OF UNCOMPLETED CONTRACTS

- A. Uncompleted Contracts (For Contracts Exceeding \$20,000) (<u>N.J.A.C.</u> 17:19-2.13(a))
  - 1. The Board requires that each Bidder (and their statutorily listed Subcontractors) submit with their bid, a certified Total Amount of Uncompleted Contracts form as prescribed by the cited regulation. (Form DPMC 701). Failure to submit this document will lead to having the bid being rejected as non-responsive.

## 1.7 CHANGES TO BID DOCUMENTS, INTERPRETATIONS AND ADDENDA

- A. Changes to the Bid Documents may be required to be issued via Addenda. Fraytak Veisz Hopkins Duthie, P.C (FVHD) Architects Planners will issue notice of the publication of all Addenda to prospective Bidders, who have obtained Bid Documents from Fraytak Veisz Hopkins Duthie, P.C (FVHD) Architects Planners. All Bidders are to check the Fraytak Veisz Hopkins Duthie, P.C (FVHD) Architects Planners website www.fvhdpc.com and download addenda if any are issued for the Project.
  - 1. All Addenda issued become a part of the Bid Documents as though originally incorporated into the Specifications.
  - 2. For the Contract for construction Work, notice shall be provided no later than seven days, Saturdays, Sundays, or holidays excepted, prior to the date for acceptance of bids, to any person who has submitted a bid or who has received

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a bid package in any of the following ways: i) in writing by certified mail or ii) by certified facsimile transmission, meaning that the sender's facsimile machine produces a receipt showing date and time of transmission and that the transmission was successful or iii) by a delivery service that provides certification of delivery to the sender.

- 3. Bidders must acknowledge receipt of all Addenda on the Bid Proposal Form or the bid shall be deemed non-responsive by the Owner.
- B. Pre-bid Request for Information: No oral interpretations will be made to any Bidder as to the meaning of the Drawings and Specifications. All Requests for Information (RFI's) must be submitted in writing by November 22, 2024 and sent by faxing to 609-883-2694; by emailing info@fvhdpc.com; or sent via common carrier to the Architect. All correspondence must include the Architect's Project Name and Project Number. The Architect is not responsible for misdirected or misrouted correspondence.

### Fraytak Veisz Hopkins Duthie, P.C. Architects / Planners 1515 Lower Ferry Rd., Trenton, NJ 08618 Electronic Facsimile (609) 883-2694 FVHD Project No. 5481

- 1. Every interpretation made to a Bidder will be in the form of an Addendum. During the bidding period, the Architect may furnish Addenda for additions to or alterations of the Drawings and Specifications, which shall be included in the Work covered by the Bid Proposal Form(s).
- 2. Addenda, when issued, will be made available no later than seven (7) business days prior to the date for receiving bids, Saturday, Sunday or holidays excepted, to all persons who have obtained Bid Documents from the Architect.
- 3. Addenda will also be available for examination at the Architect's office.
- 4. It shall be the responsibility of the Bidder to ascertain that they have received and examined all Addenda and Bulletins issued, prior to submitting their bid. Failure of the Bidder to download and examine all Addenda shall not relieve the Bidder from any of the requirements of the Bid Documents.
- 5. All Addenda will be issued in accordance with N.J.S.A. 18A:18A-21(c).

## **1.8 PREPARATION OF BIDS**

A. Enclose **two copies (one original and one copy)** of the Bid in a sealed envelope, identified on the outside of the envelope and clearly marked "BID" with the name and address of the Bidder, name of the Project and Contract number in which the Bidder is submitting.

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- B. Bids shall be submitted on the form of Bid furnished by the Architect, properly filled out and duly executed. Bid Proposal Forms shall not be altered or added to in any way. Lump Sum Bid or Base Bid prices shall be filled in, in ink or typewritten, in both words and figures. In case of discrepancy, the amount described in words shall govern.
  - 1. Bids containing any conditions, omissions, unexplained erasure or alteration, items not called for in the Bid Proposal Form, attachment of additive information not required by the Specifications, or irregularities of any kind may be rejected by the Owner.
  - 2. Any changes, white-outs, strike-outs, etc. on the Bid Proposal Form must be initialed in ink by the person responsible for signing the Bid Proposal Form.
- C. When the Bid is made by an individual, their post office address shall be stated and they shall sign the Bid. When made by a firm or partnership, its name and post office address shall be stated and the Bid shall be signed by one or more of the partners. When made by a corporation, its name and principal post office address shall be stated, and the Bid shall be signed by an authorized official of the corporation.
- D. Alternate Bids and Unit Prices for the various portions of Work for Contract shall be as stated in other Sections of the Specifications.
  - 1. Attention is called particularly to the requirements for filling in all Alternate Bids called for on the Bid Proposal Form, as the Owner reserves the right to award a Contract based upon the possible inclusion of one or more such Alternate Bids.
  - 2. The amounts of the Alternate Bids shall include any and all modifications to related, adjacent or surrounding work made necessary by use of such Alternate Bids.
  - 3. The Alternate Bids must be stated as additions to or deductions from the Base Bid, unless otherwise noted.
  - 4. The term "No Bid" shall not be used with respect to Alternate Bids and Unit Prices requested on the Bid Proposal Forms. The Bidder who does not desire to make a change from the Base Bid under a particular Alternate Bid shall so indicate by using the words "No Change or N/C." Failure to bid or use of the term "No Bid" on any Alternate shall cause rejection of entire bid.
  - 5. Bidders must bid on every Alternate Bid. Additions to, or deductions from, the base bid shall be indicated in the appropriate blanks on the Bid Proposal Form with additions to or deductions from the base bid filled in as appropriate. If a particular Alternate Bid does not result in an addition to or deduction from the base bid, the words "No Change" or N/C" shall be written in the blank for "No Change" on the Bid Proposal Form, and the words "No Change" shall be written in the blank provided for the purpose of stating the numeric amount in words.

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Failure to bid on every Alternate Bid <u>shall</u> render the bid nonresponsive and shall cause the bid to be rejected.

## **1.9 BID GUARANTEE**

- A. The Bid, when submitted, shall be accompanied by a Bid Guarantee in the form of a Certified Check, Cashier's Check or acceptable Bid Bond made payable unconditionally to the Owner, in the sum of ten percent (10%) of the Bid, but in no case in excess of \$20,000.00 and as per Bid Bond Form included:
  - 1. Bid Bond Form: Bid Bond shall be as per the form included and shall include an effective and current Power of Attorney authorizing the Attorney-in Fact to bind the Surety, on Bid Date and Time, for the full amount of the Bond.
  - 2. Bid shall be accompanied by a Proposition of Surety in accordance with paragraph 1.10.
- B. Pursuant to <u>N.J.S.A.</u> 18A:18A-36, all Bid Guarantees, except those of the three apparent lowest responsible Bidders, will be returned, if requested, after ten (10) days from opening of bids, Sundays and holidays excepted. Within three (3) days after the awarding of the Contract and the approval of the Contractor's performance bond and payment bond, the bid security of the remaining unsuccessful Bidders will be returned, Sundays and holidays excepted.
- C. The Bid Guarantee shall be forfeited if successful Bidder fails to execute the Agreement between Owner and Contractor identified in paragraph 1.13 hereof and furnish the Performance-Payment Bond within ten (10) days after notification of award of Contract to them (Sundays and holidays excepted).
  - 1. Any failure by the successful Bidder to perform its obligations regarding the time, manner, and substance of compliance with Bid Documents in relation to the Award of a Contract, shall constitute an Event of Default, entitling the Owner to:
    - a. Demand, from said guarantor, immediate payment of the entire Bid Bond amount, as liquidated damages, not as a penalty, for the delay which is acknowledged and agreed that the Owner will sustain in connection with said Default; and in addition thereto,
    - b. Recovery of any and all other Losses incurred by the Owner, to which the Owner shall, to the fullest extent permitted by Applicable Law, be entitled to recover, including without limitation Special Damages.

## 1.10 CONTRACT BONDS

A. Prior to start of guarantee period and before the final payment is made, the Contractor shall provide the Owner with a Maintenance Bond in the amount of ten percent (10%) of Final Contract Amount, to insure the replacement or repair of defective materials or workmanship during the one-year guarantee period. Pursuant to N.J.S.A. 18A:18A-25, Bids shall be accompanied by a Proposition of Surety in form

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as bound in these documents, assuring that satisfactory arrangements have been made between the Surety and the Bidder by which Surety agrees to furnish within ten (10) days after notification of award, Sundays and holidays excepted, of Contract, a <u>Performance Bond and a Payment Bond; each in the amount of 100% of the amount bid.</u>

- The Proposition of Surety shall be executed by an approved Surety company authorized to do business in the State of New Jersey and in accordance <u>N.J.S.A.</u> 2A:44-143, and with the three highest rating categories of rating companies nationally recognized and listed as per Appendix A (go to <u>www.nj.gov/dobi/surety.htm</u>).
- 2. If, at any time after execution and approval of a Contract and Performance-Payment Bond required by Bid Documents, such Bond shall cease to be adequate security for the Owner, the Contractor shall, within five (5) days after notice to do so, furnish a new or additional Bond, in form, sum and signed by such Sureties as shall be satisfactory to the Owner. No further payment shall be deemed due nor shall any further payment be made to the Contractor unless and until such new or additional Bond shall be furnished and approved.
- B. Prior to start of guarantee period and before the final payment is made, the Contractor shall provide the Owner with a <u>Maintenance Bond in the amount of ten</u> <u>percent (10%) of Final Contract Amount</u>, to insure the replacement or repair of defective materials or workmanship during the **one-year** guarantee period.
- C. The cost of all Bonds shall be paid for by the Contractor and shall be included as a part of Contractor's bid price.

## 1.11 POWER OF ATTORNEY

A. Attorneys-in-fact who sign Bid Bonds, Performance and Payment Bonds, Maintenance Bonds and Proposition of Surety forms must accompany each bond or proposition with a certified and effectively dated copy of their power-of-attorney.

## 1.12 FORM OF AGREEMENT

A. The form of agreement shall be AIA Document A101 Standard Form of Agreement between Owner and Contractor, (Stipulated Sum) 2017 Edition, and in accordance with AIA Document A201 General Conditions of the Contract, 2017 Edition as amended, and all other documents referenced herein.

## 1.13 CERTIFICATE OF AUTHORITY

A. All Bidders are to submit their Sworn Contractor Certification, a current valid "Certificate of Authority" as issued by the New Jersey Department of Treasury. Reference - N.J.S.A. 18A:7G-37.

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### 1.14 AWARD OF CONTRACT

- A. Award, if made, will be to the lowest responsive and responsible Bidder for the Single Overall Building Contract selected to include Alternate Bids, if any, which the Owner chooses to accept, that results in the lowest aggregate total sum pursuant to <u>N.J.S.A.</u> 18A:18A-4.
- B. Award made to a Bidder not a resident of the State of New Jersey is conditioned upon Bidder designating a proper agent in the State of New Jersey on whom service can be made in the event of litigation.
- C. If the successful Bidder is a corporation not organized under the laws of New Jersey, the award of Contract and payment of consideration thereunder shall be conditioned upon the Corporation procuring a certificate of authority to transact business in the State of New Jersey pursuant to <u>N.J.S.A.</u> 14A:13-3 and complying with the provisions of <u>N.J.S.A.</u>14A:13-4.
- D. NJ Business Registration Certificate:
  - 1. Pursuant to <u>N.J.S.A.</u> 52:32-44, <u>Egg Harbor Township School District</u> ("Owner") is prohibited from entering into a Contract with an entity unless the Bidder/proposer/Contractor, and each Subcontractor that is required by law to be named in a bid/proposal/Contract has a valid Business Registration Certificate on file with the Division of Revenue and Enterprise Services within the Department of the Treasury.
  - 2. Prior to Contract award or authorization, the Contractor shall provide the Owner with its proof of business registration and that of any named Subcontractor(s).
  - 3. Subcontractors named in a bid or other proposal shall provide proof of business registration to the Bidder, who in turn, shall provide it to the Owner prior to the time a Contract, purchase order, or other Bid Document is awarded or authorized.
  - 4. During the course of Contract performance:
    - a. the Contractor shall not enter into a Contract with a Subcontractor unless the Subcontractor first provides the Contractor with a valid proof of business registration.
    - b. the Contractor shall maintain and submit to the Owner a list of Subcontractors and their addresses that may be updated from time to time.
    - c. the Contractor and any Subcontractor providing goods or performing services under the Contract, and each of their affiliates, shall collect and remit to the Director of the Division of Taxation in the Department of the Treasury, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) on all sales of tangible personal property delivered into the State. Any questions in this regard can be directed to the Division of Taxation at (609)292-6400. Form NJ-REG can be filed online at http://www.state.nj.us/treasury/revenue/busregcert.shtml.

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- 5. Before final payment is made under the Contract, the Contractor shall submit to the Owner a complete and accurate list of all Subcontractors used and their addresses.
- 6. Pursuant to <u>N.J.S.A.</u> 54:49-4.1, a business organization that fails to provide a copy of a business registration, as required, or that provides false business registration information, shall be liable for a penalty of \$25 for each day of violation, not to exceed \$50,000, for each proof of business registration not properly provided under a Contract with the Owner.
- 7. Emergency Purchases or Contracts
  - a. For purchases of an emergent nature, the Contractor shall provide its Business Registration Certificate within two weeks from the date of purchase or execution of the Contract or prior to payment for goods or services, whichever is earlier.
- E. The Owner reserves the right to reject all bids, or to waive minor informalities or nonmaterial exceptions in a bid, pursuant to applicable law.
- F. In accordance with requirements of the <u>N.J.S.A.</u> 18A:18A-36(b), execution of the Contract by all parties will be done within 21 days of the notification of the award date, Sundays and holidays excepted, after making the award.
  - 1. The Bidder to whom the Contract is awarded shall be required to execute said Contract within twenty (20) calendar days of the notification of the award to them, Sundays and holidays excepted, after making the award.
- G. Upon award of the Contract, the Contractor shall execute and return to the Owner the "Contractor Certification and Consent Upon Award of Contract," attached to the Contract as an Exhibit.
- H. The award of the Contract is subject to availability and appropriation of sufficient funds.

## 1.15 BID PROTESTS AND CONTRACTOR'S RESPONSIBILITY

- A. Contractors may contact the Purchasing Agent in writing, when they feel it necessary to challenge a procurement Specification item or to protest an award of Contract. All challenges and protests will be reviewed by the Purchasing Agent, the District Administrator of the Contract and the Board Attorney. All determinations shall be made in writing to the Contractor. The Purchasing Agent pursuant to <u>N.J.S.A.</u> 18A:18A-2 (b) is the School Business Administrator.
- B. A bid protest filed shall:
  - 1. Include the name, street address, electronic mail address, and telephone and facsimile numbers of the protester;

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- 2. Be signed by the protester or its representative;
- 3. Identify the bid or solicitation number and date of bid or solicitation;
- 4. Include a detailed statement of the legal and factual grounds of protest including copies of relevant documents;
- 5. Set forth all information establishing that the protester is an interested party for the purpose of filing a protest;
- 6. Set forth all information establishing the timeliness of the protest; and
- 7. Provide any or all information pertaining to the bid protest.

## 1.16 **BIDDING DOCUMENTS**

- A. The Bid Documents consist of, but are not limited to, the following:
  - 1. Instructions to Bidders in accordance with this Section,
  - 2. General Conditions, AIA Document A201, and as supplemented in the Supplementary General Conditions; Section 00800,
  - 3. Bid Proposal Form including attachments as per Bidder's Checklist,
  - 4. Addenda, if issued,
  - 5. Specifications: As outlined in the "Index" included in the Project Manual,
  - 6. Drawings: As per List of Drawings indicated on Project Title Sheet and in accordance with Section 00850,
  - 7. Agreement Between Owner & Contractor, AIA Document A101 and as amended by the Project Specifications.
- B. <u>Note:</u> The above list is not intended to establish an order of precedence.

## 1.17 TIME OF COMPLETION AND LIQUIDATED DAMAGES

A. Refer to Section 01800, "Time of Completion and Liquidated Damages."

## 1.18 LISTING OF STOCKHOLDERS, PARTNERS OR MEMBERS (N.J.S.A. 52:25-24.2)

- A. Statement of Ownership
  - 1. No business organization, regardless of form of ownership, shall be awarded any Contract for the performance of any work or the furnishing of any goods and

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services, unless, prior to the receipt of the bid or accompanying the bid of said business organization, Bidders shall submit a statement setting forth the names and addresses of all persons and entities that own ten (10%) percent or more of its stock or interest of any type at all levels of ownership.

- 2. The included Statement of Ownership shall be completed and attached to the bid proposal. This requirement applies to all forms of business organizations, including, but not limited to, corporations and partnerships, publicly-owned corporations, limited partnerships, limited liability corporations, limited liability partnerships, sole proprietorship, and Subchapter S corporations. Failure to submit a disclosure document shall result in rejection of the bid as it cannot be remedied after bids have been opened.
- 3. Not-for-profit entities should fill in their name, check the not-for-profit box, and certify the form. No other information is required.

## 1.19 NON-COLLUSION AFFIDAVIT

A. The Bidder shall submit the Non-Collusion Affidavit, on form as bound herein, must be submitted with the bid. Failure to submit this document will lead to having the bid being rejected as non-responsive.

## 1.20 FALSE MATERIAL REPRESENTATION / TRUTH IN CONTRACTING

- A. A person commits a crime if the person knowingly makes a material representation that is false in connection with the negotiation, award or performance of a government Contract. If the Contract amount is for \$25,000.00 or above, the offender is guilty of a crime of the second degree. If the Contract amount exceeds \$2,500.00, but is less than \$25,000.00, the offender is guilty of a crime of the third degree. If the Contract amount is for \$2,500.00 or less, the offender is guilty of a crime of the fourth degree. Bidder should be aware of the following statutes that represent "Truth in Contracting" laws:
  - 1. <u>N.J.S.A.</u> 2C:21-34, governs false claims and representations by Bidders. It is a serious crime for the Bidder to knowingly submit a false claim and/or knowingly make material misrepresentation.
  - 2. <u>N.J.S.A.</u> 2C:27-11 provides that a Bidder commits a crime if said person, directly or indirectly, confers or agrees to confer any benefit not allowed by law to a public servant.
  - 3. Bidder should consult the statutes such as <u>N.J.S.A.</u> 18A:7G-39 or legal counsel for further information.

## 1.21 EQUIVALENT PRODUCTS

A. The use of manufacturers' brand names, catalogue numbers and similar proprietary

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identifying data in the Bid Documents are not intended to eliminate from consideration products that are equivalent in quality, appearance and function to those specified.

## 1.22 CONTRACT

A. As indicated in the Advertisement for Bids, the Owner is intended to receive sealed bids and to award and administer the Contract for the work required by the Contract Documents as follows:

#### **Single Overall Contract**

B. The Bidder shall be a firm classified by the State of New Jersey - Division of Property Management and Construction for the following classification:

Prime General Contractor C009 - General Construction/Alterations and Additions and have Subcontractor(s) for the following classification(s) of work:

<u>Subcontractors:</u> C029 - Structural Steel & Ornamental Iron C030 - Plumbing C032 - HVACR C047 - Electrical

- C. Pursuant to <u>N.J.S.A.</u> 18A:18A-26, the Bidder shall be in possession of the required DPMC Classification for the specified work.
  - 1. In the case of a Combined Single Overall Bid, if the Contractor possess the DPMC Classification in one category, but not in <u>all</u> of the required categories, the Contractor must list the Prime Subcontractor(s) bidding the scope of work for the other categories. The Subcontractor(s) must possess the DPMC Classification(s) in that category.
  - 2. Each Bidder with Plumbing and Drainage Work shall include name of Subcontractor for Sprinkler System Work, when the work of the Subcontractor exceeds 35% of the Owner's estimated amount of the value of the Work, and shall submit evidence that the Bidder or their Subcontractor is qualified for in accordance with <u>N.J.S.A.</u> 18A:18A-26 for Sprinkler System Work.

END OF SECTION 00100

#### **BID PROPOSAL FORM**

### SINGLE OVERALL CONTRACT

DPMC Classifications: C009 Prime Contractor with C029, C030, C032 & C047 Subcontractors

Egg Harbor Township School District Board of Education Daniel Smith, Business Administrator/Board Secretary 13 Swift Drive Egg Harbor Township, NJ 08234

1. The undersigned, having familiarized themself with the local conditions affecting the cost of the work, the Drawings, the Specifications and other Bid Documents, as in the Advertisement for Bids thereto, for the **Renovations for Five (5) Pre-K Classrooms at Clayton J. Davenport Elementary School (FVHD-5481),** 2501 Spruce Avenue, Egg Harbor Township, NJ 08234 together with all work incidental thereto, in accordance with the requirements of the Drawings and Specifications prepared by Fraytak Veisz Hopkins Duthie, P.C., Architects/Planners, Trenton, New Jersey, hereby proposes to furnish all labor, materials and equipment required for all Work and as follows:

**SINGLE OVERALL CONTRACT - LUMP SUM BID:** All Work at the above referenced school, including applicable Allowances - Section 01020, in accordance with the requirements of Bid Documents. If written amount differs from the numerical figure, only the written amount will be accepted as the correct bid.

Total Lump Sum Bid including Allowance:	\$
	(Numerical)

(To be written in full)

#### THE REMAINDER OF THIS PAGE WAS INTENTIONALLY LEFT BLANK

Submitted by:

#### Self-Drying Finishing Underlayment per Section 03450 \$ per sq. ft. **UNIT PRICES - PLUMBING & DRAINAGE: Materials in Place.** 1-1/2" sanitary and vent pipe above grade \$ per lin. ft. 2" sanitary and vent pipe above grade \$ per lin. ft. 2-1/2" sanitary and vent pipe above grade \$\_\_\_\_\_ per lin. ft. 3" sanitary and vent pipe above grade \$\_\_\_\_\_ per lin. ft. \$\_\_\_\_\_ per lin. ft. 2" sanitary and vent pipe below grade 3" sanitary and vent pipe below grade \$ per lin. ft. 4" sanitary and vent pipe below grade \$ per lin. ft. 1/2" domestic water pipe above ground with insulation \$ per lin. ft. \$ \_\_\_\_\_ per lin. ft. 3/4" domestic water pipe above ground with insulation 1" domestic water pipe above ground with insulation \$\_\_\_\_\_ per lin. ft. 1-1/4" domestic water pipe above ground with insulation \$\_\_\_\_\_ per lin. ft. 1-1/2" domestic water pipe above ground with insulation \$\_\_\_\_\_ per lin. ft. 1" black steel schedule 40 pipe \$\_\_\_\_\_ per lin. ft. 1-1/2" black steel schedule 40 pipe \$\_\_\_\_\_ per lin. ft. 2" black steel schedule 40 pipe \$\_\_\_\_\_ per lin. ft. 2-1/2" black steel schedule 40 pipe \$\_\_\_\_\_ per lin. ft. 2" cast iron pipe below grade \$ per lin. ft. 2-1/2" cast iron pipe below grade \$\_\_\_\_\_ per lin. ft. 3" cast iron pipe below grade \$\_\_\_\_\_ per lin. ft. 4" cast iron pipe below grade \$ per lin. ft. 1-1/2" copper DWV tube above floor \$\_\_\_\_\_ per lin. ft. 2" service weight cast iron pipe below floor, including concrete floor cutting, excavation and backfill. Final floor patching by GC. \$ per lin. ft. 3" service weight cast iron pipe below floor, including concrete floor cutting, excavation and backfill. Final floor patching by GC. \$ per lin. ft. 4" service weight cast iron pipe below floor, including concrete floor cutting, excavation and backfill. Final floor patching by GC. \_\_\_\_\_ per lin. ft. \$

UNIT PRICES - GENERAL CONSTRUCTION: Materials in Place.

Submitted by:\_\_\_\_\_

(Firm Name)

#### UNIT PRICES - HEATING AND VENTILATING: Materials in Place.

Galvanized steel ductwork, insulated, no liner	\$ per lb.
Galvanized steel ductwork, insulated, including liner	\$ per lb.
12x12 Diffuser	\$ per unit
12x12 Return Register	\$ per unit

#### UNIT PRICES - ELECTRICAL WORK: Materials in Place.

Power outlet (duplex or quadraplex), including outlet boxes and wiring. Receptacles will generally be connected within 10' of adjacent receptacle circuits	\$ per unit
Single Channel Surface Raceway	\$ per lin. ft.
Exterior weatherproof duplex power receptacle including up to 100 feet of (2)#12, (1)#12G, in $3/4$ " conduit	\$ per unit
Wall mounted occupancy sensor, including wall box and wiring.	\$ per unit
Ceiling mounted occupancy sensor, including wiring.	\$ per unit
Corner mounted occupancy sensor, including wiring.	\$ per unit
Photosensor (daylight harvesting sensor), including wiring.	\$ per unit
Fire Alarm System - Fire Alarm Pull Device, including outlet box and wiring	\$ per unit
Fire Alarm System - Smoke Detector Device, including outlet box and wiring	\$ per unit
Fire Alarm System - Heat Detector Device, including outlet box and wiring	\$ per unit
Carbon Monoxide Detector, including outlet box, wiring, and associated programming	\$ per unit
Fire Alarm system wiring	\$ per lin. ft.
Fire Alarm system programming	\$ per Fire Alarm point
Dual Jack data/telephone outlet relocation within 25' from current location	\$ per unit
Interior cat-6 cable	\$ per lin. ft.
Floor outlet box in existing floor including 10 ft. of cutting, patching	\$ per unit

3.	Bidder hereby acknowledges receipt of the following Addenda:
	No. Addenda logued $\Box$

	No Addenda Issued 🗆			
	Addendum No. <u></u> ,	issued	received	_(initial)
	Addendum No. <u></u> ,	issued	received	_(initial)
	Addendum No. <u></u> ,	issued	received	_(initial)
	Addendum No. <u></u> ,	issued	received	_(initial)
4.	In submitting this bid, it pursuant to <u>N.J.S.A</u> . 18 responsible, and it is agr set of the opening there	t is understood that the A:18-22 and any bid the reed that this bid may no eof.	right is reserved by the at is non-responsive o t be withdrawn for a pe	e Owner to accept or to reject bids r submitted by a Bidder that is not eriod of sixty (60) days from the date

5.	Bid Security in the sum of	(\$)
	in the form of	(Certified Check, Cashier's Check, or Bid Bond) is submitted
	herewith in accordance with the requirements	s of the Specifications.

6. The undersigned is an individual () a partnership () a corporation () under the laws of the State of \_\_\_\_\_,

having principal office in the \_\_\_\_\_\_ , County of \_\_\_\_\_\_, and State of \_\_\_\_\_\_.

Respectfully Submitted,

(Company Name, if Bidder is a company)

**BIDDER'S SIGNATURE** 

(Company Officer, if Bidder is a Corporation or LLC)

(Seal, if Corporation)

Printed or Typed Name Title of Officer (if the Bidder is a Company)

Address

City, State, Zip Code

Dated

Phone & Fax

Email Address

NOTE: SEE BIDDERS CHECKLIST

Submitted by:\_\_\_\_\_

## **BIDDER'S CHECKLIST**

The following checklist along with the listed documents must be signed and submitted with the bid package to the Owner as part of the Bid Documents. Failure to submit documents marked (\*) is cause for rejection.

	Reviewed the Bid Documents (Including the Permits Obtained by the Owner), Satisfied Themselves Regarding the Character of the Work Site, Reviewed Locality, and All Local Conditions and Laws and Regulations That in Any Manner May Affect Cost, Progress, Performance or Furnishing of Work	
	Reviewed General Bond Requirements	
	Reviewed the Bid Documents contained herein (Owner/Contractor)	
	ITEM	
(*)	Bidder's Proposal	
(*)	Bid Bond, Certified Check, Cashier's Check or Any Combination Thereof in an Amount of Ten Percent (10%) of the Total Amount of Bid, Not to Exceed \$20,000 (Twenty Thousand Dollars) with Power of Attorney	
(*)	Consent of Surety for 100% of the Contract Amount with Power of Attorney to Provide Performance Bond and Labor and Material Payment Bond	
(*)	Subcontractor Identification Statement	
(*)	Statement of Ownership Disclosure Certification	
(*)	Division of Property Management & Construction (DPMC) Form 701 - Total Amount of Uncompleted Contracts, <u>N.J.A.C.</u> 17:19-2.13 All Contractor(s) and Named Subcontractor(s)	
(*)	Division of Property Management & Construction (DPMC) Current Notice of Classification - All Contractor(s) and Named Subcontractor(s)	
(*)	Non Collusion Affidavit	
	Public Works Contractors Registration Act Certificate ( <u>N.J.S.A.</u> 34:11-56.48) All Contractor(s) and Named Subcontractor(s)	
	Business Registration Certificate - All Contractor(s) and Subcontractor(s)	
	Federal and State Non-debarment Certifications - All Contractor(s) and Subcontractor(s)	
	Certification of non Debarment for Federal Government Projects Shall Be Submitted Prior to Award of Contract - All Contractors	
	Trade License - All Contractor(s) and Subcontractor(s)	
	HVACR Master License (HVACR Contractors)	
	Compliance with New Jersey Prevailing Wage Act	
	Certification of Insurance Statement	

## **BIDDER'S CHECKLIST**

Certification of No Material Change of Circumstances - All Contractor(s)	
Performance Record Certification	
Political Contribution Disclosure Form	
Americans with Disabilities Act Language	
Mandatory Equal Employment Opportunity Language	
Supplemental Conditions Pursuant to the Education Construction and Financing Act - All Contractor(s) and Subcontractor(s)	
Prior Negative Experience Questionnaire	
Status of Present Contracts	
NJSDA Exhibit E-2 Form of Contractor Certification and Consent	
Contractors shall participate in an "apprenticeship training program" and shall submit evidence of same and/or a description of the contractor's apprenticeship training program prior to the award of the Contract.	

Note: (\*) Indicates Documents to be submitted with the Bidder's Proposal. Failure to submit all documents may be cause rejection. All forms must be provided prior to award of Contract.

By signing below, I acknowledge having read and fully understand all the requirements of each of the documents referenced herein.

BIDDER (Signature)

Dated:\_\_\_\_\_

BIDDER (Print Name)

#### **BID BOND**

**THE UNDERSIGNED BIDDER** and **"Surety"**, a corporation duly authorized to transact business in the State of New Jersey, are held and firmly bound unto \_\_\_\_\_\_\_(the **"OWNER"**) for the full and just sum of:

	Dollars (\$		),
(10% of the Bid Price not to exceed \$20,000.00: words)		(figures)	

The payment of which sum the **BIDDER** has submitted a Bid to perform certain Work described in Bidding Documents entitled:

TITLE:\_\_\_\_\_

CONTRACT NO.:

The **Surety** hereby agrees to pay the full face value of this Bond to the **OWNER**, as Liquidated Damages, and not as a penalty, unless this Bond is void.

This Bond shall only be void if the **BIDDER** well, truly and faithfully performs all requirements contained in the Bidding/Contract Documents incident to an Award of the Contract including, but not limited to, proper execution and submission of the Contract Forms and all other required documentation.

On this	day of	_ 20	, the <b>BIDDER</b>	and Surety	hereby	bind
themselves herein:						

FOR THE BIDDER:

FOR THE SURETY:

(Name of **BIDDER**)

(Name of **Surety**)

By:\_\_\_\_\_\_ (Print Name-**BIDDER's** Authorized Representative) By:\_\_\_\_\_\_ (Print Name of Attorney-in-Fact)

By:\_\_\_\_\_\_\_ (Signature-**BIDDER's** Authorized Representative) By:\_\_\_\_\_\_ (Signature of Attorney-in-Fact)

#### **IMPORTANT – ATTACH AND SUBMIT WITH THE BID:**

## • A POWER OF ATTORNEY FOR THE ATTORNEY-IN-FACT WHICH IS CURRENTLY DATED AND VALID FOR THE ENTIRE AMOUNT OF THE BOND

## FORM OF CONSENT OF SURETY

#### PERFORMANCE BOND, PAYMENT BOND and MAINTENANCE BOND

For and in consideration of the sum of one dollar (\$1.00) lawful money of the United States, the receipt is hereby acknowledged, paid to the undersigned surety, and for other valuable consideration, the undersigned surety, authorized to transact business in the State of certifies and agrees that if the Contract entitled:

CONTRACT (NUMBER)

(TITLE)

is awarded to:

(BIDDER'S NAME)

the undersigned hereby warrants that it is in all respects gualified to provide the required Bonds as set forth in the Contract Documents, and that it will provide and execute the **Performance** Bond in the full amount of awarded contract in the event that said contractor is awarded a contract for the above project, the **Payment Bond**, and the **Maintenance Bond** in the form and as otherwise required by the Contract Documents.

(Print Name of Surety)

(Print Name of Attorney-in-Fact)

(Signature of Attorney-in-Fact)

#### ATTACH AND SUBMIT WITH THE BID: A POWER OF ATTORNEY FOR THE ATTORNEY -IN-FACT WHICH IS CURRENTLY DATED AND VALID FOR THE TOTAL AMOUNT OF ALL BONDS.

Consent of Surety must be signed by an authorized agent or representative of a surety company and not by the individual or company representative submitting the bid.

NOTE: IF SUBCONTRACTORS ARE LISTED ON BID FORM, N.J.S.A. 18A:18A-18 REQUIRES THAT EVIDENCE OF PERFORMANCE SECURITY AS TO SUBCONTRACTORS BE SUBMITTED WITH THE BID, EITHER BE THE BIDDER ON ITS OWN BEHALF AND ON BEHALF OF ALL LISTED SUBCONTRACTORS, OR BY EACH SUBCONTRACTOR, OR ANY COMBINATION THEREOF, PROVIDED THAT THE PERFORMANCE SECURITY IN TOTAL EOUALS, BUT DOES NOT EXCEED, THE TOTAL AMOUNT OF THE BID.

## **SUBCONTRACTOR IDENTIFICATION STATEMENT**

The following information is to be provided in the case of all subcontractors who will furnish labor of the various trades governed by <u>N.J.S.A.</u> 18A:18A-18 (b) (General Construction, Steel, Plumbing, HVAC, Electric).

TRADE	Contractor's Name/Address/Telephone	NJ License No.

If work of the types designated by the above referenced law will be performed by the Bidder, the Bidder shall state below and shall enclose copies of licenses covering each trade.

TRADE	N.J. License No.

#### STATEMENT OF OWNERSHIP DISCLOSURE

N.J.S.A. 52:25-24.2 (P.L. 1977, c.33, as amended by P.L. 2016, c.43)

This statement shall be completed, certified to, and included with all bid and proposal submissions. Failure to submit the required information is cause for automatic rejection of the bid or proposal.

Name of Organization:
Organization Address:
<b><u>Part</u></b> I Check the box that represents the type of business organization:
Sole Proprietorship (skip Parts II and III, execute certification in Part IV)
Non-Profit Corporation (skip Parts II and III, execute certification in Part IV)
For-Profit Corporation (any type)
Partnership Limited Partnership Limited Liability Partnership (LLP)
Other (be specific):
Part II

The list below contains the names and addresses of all stockholders in the corporation who own 10 percent or more of its stock, of any class, or of all individual partners in the partnership who own a 10 percent or greater interest therein, or of all members in the limited liability company who own a 10 percent or greater interest therein, as the case may be. (COMPLETE THE LIST BELOW IN THIS SECTION)

OR

No one stockholder in the corporation owns 10 percent or more of its stock, of any class, or no individual partner in the partnership owns a 10 percent or greater interest therein, or no member in the limited liability company owns a 10 percent or greater interest therein, as the case may be. (SKIP TO PART IV)

(Please attach additional sheets if more space is needed):

Name of Individual or Business Entity	Home Address (for Individuals) or Business Address

#### <u>Part III</u> DISCLOSURE OF 10% OR GREATER OWNERSHIP IN THE STOCKHOLDERS, PARTNERS OR LLC MEMBERS LISTED IN PART II

If a bidder has a direct or indirect parent entity which is publicly traded, and any person holds a 10 percent or greater beneficial interest in the publicly traded parent entity as of the last annual federal Security and Exchange Commission (SEC) or foreign equivalent filing, ownership disclosure can be met by providing links to the website(s) containing the last annual filing(s) with the federal Securities and Exchange Commission (or foreign equivalent) that contain the name and address of each person holding a 10% or greater beneficial interest in the publicly traded parent entity, along with the relevant page numbers of the filing(s) that contain the information on each such person. Attach additional sheets if more space is needed.

Website (URL) containing the last annual SEC (or foreign equivalent) filing	Page #'s

**Please list** the names and addresses of each stockholder, partner or member owning a 10 percent or greater interest in any corresponding corporation, partnership and/or limited liability company (LLC) listed in Part II **other than for any publicly traded parent entities referenced above**. The disclosure shall be continued until names and addresses of every noncorporate stockholder, and individual partner, and member exceeding the 10 percent ownership criteria established pursuant to N.J.S.A. 52:25-24.2 has been listed. Attach additional sheets if more space is needed.

Stockholder/Partner/Member and Corresponding Entity Listed in Part II	Home Address (for Individuals) or Business Address

#### Part IV Certification

I, being duly sworn upon my oath, hereby represent that the foregoing information and any attachments thereto to the best of my knowledge are true and complete. I acknowledge: that I am authorized to execute this certification on behalf of the bidder/proposer; that the *West Windsor Plainsboro Regional School District* is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the completion of any contracts with *Board of Education* to notify the *Board of Education* in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the, permitting the *Board of Education* to declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print):	Title:	
Signature:	Date:	

### **NON-COLLUSION AFFIDAVIT**

STATE OF NEW JERSEY/	
(Specify, if Other)	
COUNTY OF	
I,	, ${\mathfrak f}$ the (City, Town, Borough) of
State of	, ɗ full age, being duly
sworn according to law on my oath depose and say	that:
I am of the fi	rm of, the
Bidder making the Proposal for the above named Pro-	ojects, and that I executed the said Proposal with
full authority to do so; that said Bidder has not, dire	ectly or indirectly, entered into any agreement,
participated in any collusion, or otherwise taken any	action in restraint of free, competitive bidding in
connection with the above named Project; and that	all statements contained in said Proposal and in
this affidavit are true and correct, and made with ful	l knowledge, and the State of New Jersey relies
upon the truth of the statements contained in this affic	davit in awarding the contract for the said Project.
I further warrant that no person or selling agency ha	s been employed or retained to solicit or secure
such contract upon an agreement or understandin	g for a commission, percentage, brokerage or
contingent fee, except bona fide employees or bona	a fide established commercial or selling agencies
maintained by	(Name of Contractor)
Bv:	
(Signature of Authorized Representative)	
Subscribed and sworn to before me	
this day of, 20	
(Seal) Notary Public of New Jersey/	
Specify Other State	

My Commission Expires \_\_\_\_\_, 20\_\_\_.

## THIS FORM MUST BE COMPLETED, SIGNED, NOTARIZED, AND SUBMITTED WITH BID

## **EQUIPMENT CERTIFICATION**

Title	e of Bid:
Bid	I No Bid Date: (Weekday, Month 00, 20)
In a	accordance with N.J.S.A. 18A:18A-23, I hereby certify that
A)	(Name of Company) owns all the necessary equipment as required by the specifications and to complete the specified public work project.
	or
B)	<u>(Name of Company)</u> leases or controls all the necessary equipment as required by the specifications and to complete the specified public work project.
	PLEASE NOTE: If your company is not the actual owner of the equipment, you shall submit with the bid
	1. A certificate stating the source from which the equipment will be obtained and
	<ol> <li>Obtain and submit with the bid a certificate from the owner and person in control of the equipment, definitely granting to the bidder the control of the equipment required during such time it may be necessary for the completion of that portion of the contract for which said equipment will be necessary.</li> </ol>
Nai	me of Company
Aut	thorized AgentTitle

Authorized Signature\_\_\_\_\_

## Compliance with New Jersey Prevailing Wage Act (N.J.S.A. 34:11-56.25 et seq.)

Every Contractor and Subcontractor performing services in connection with this Project, shall pay all workers a wage rate not less than the published prevailing wage rates, for the locality the work is being performed, as designated by the New Jersey Department of Labor and Workforce Development (NJ DLWD).

Wage rates for the county of the location of the Public Agency (Owner), as published by the State Department of Labor and Workforce Development (DLWD), can be viewed at https://www.nj.gov/labor/wagehour/wagerate/prevailing\_wage\_determinations.html

The Contractor must complete and sign the "Prevailing Wage Certification" form included in the bid package and submit with his bid. This form confirms the Contractor's intention to comply with the Act. The Owner may terminate the contract if Contractor fails to pay workers prevailing wage. The prevailing wage rates in affect at the time of award, will be included by Owner as a part of the construction contract.

Public Law S-1442/A-5345, now P.L. 2023, c. 138, requires public works contractors to register and certify payroll for public works projects to be completed online at https://njwage.nj.gov

## PREVAILING WAGES COMPLIANCE CERTIFICATION

It is the determination that this is a public works project that in total will exceed \$2,000.00 (two thousand dollars), therefore prevailing wages rules and regulations apply as promulgated by the New Jersey Prevailing Wage Act and in conformance with N.J.S.A. 34:11-56:25 et seq.

## Certification

- 1. I certify that our company understands that this project requires prevailing wages to be paid in full accordance with the law.
- 2. I further certify that all subs named in this bid understand that this project requires the sub to pay prevailing wages in full accordance with the law.

## **Non-compliance Statement**

If it is found that any worker, employed by the Contractor or any Subcontractor covered by said contract, has been paid a rate of wages less than the prevailing wage required to be paid by such contract, the Owner, may begin proceedings to terminate the Contractor's or Subcontractor's right to proceed with the work, or such part of the work as to which there has been a failure to pay required wages and to prosecute the work to completion or otherwise. The Contractor and his sureties shall be liable for any excess costs occasioned thereby to the public body.

## NOTIFICATION OF VIOLATIONS – New Jersey Department of Labor and Workforce Development

Has the Bidder or any person having an "interest" with the Bidder, been notified by the New Jersey Department of Labor and Workforce Development by notice issued pursuant to N.J.S.A. 34:11-56a et seq that he/she has been in violation for failure to pay prevailing wages as required by the New Jersey Prevailing Wage Act within the last five (5) years?

\*Yes\_\_\_\_\_ No\_\_\_\_\_

\*If yes, please attach a signed document explaining any/or all administrative proceedings with the Department within the last five (5) years. Please include any pending administrative proceedings with the Department if any.

## **Submission of Certified Payroll Records**

NJ Public Law S-1442/A-5345, now P.L.2023, c.138, requires public works contractors to register and certify payroll online for public works projects at <u>https://njwages.nj.gov</u>.

Name of Company \_\_\_\_\_\_ Authorized Agent \_\_\_\_\_\_ Authorized Signature \_\_\_\_\_
# CERTIFICATION OF NON-DEBARTMENT FOR FEDERAL GOVERNMENT CONTRACTS N.J.S.A. 52:32-44.1 (P.L. 2019, c.406)

# Public Works Contracts

Project No.\_\_\_\_\_ Title of Bid\_\_\_\_\_

This certification shall be completed, certified to, and submitted to the contracting unit **prior to contract award**, except for emergency contracts where submission is required prior to payment.

	PART I: VENDOR INFORMATION			
Individual or				
Organization Name				
Address of Individual				
or Organization				
DUNS Code				
(if applicable)				
CAGE Code				
(if applicable)				
Check the box that represents the type of business organization:				

□Sole Proprietorship □Non-Profit Corporation (skip Parts III and IV)

□For-Profit Corporation (any type) □Limited Liability Company (LLC) □Partnership

Limited Partnership Limited Liability Partnership (LLP)

Other (be specific): \_\_\_\_\_

# PART II – CERTIFICATION OF NON-DEBARMENT: Individual or Organization

I hereby certify that the **individual or organization listed above in Part I** is not debarred by the federal government from contracting with a federal agency. I further acknowledge: that I am authorized to execute this certification on behalf of the above- named organization; that the \_\_\_\_\_\_\_ ("OWNER") is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the date of contract award by "OWNER" to notify the "OWNER" in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the "OWNER", permitting the "OWNER" to declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print):	Title:	
Signature:	Date:	

PART III – CERTIFICATION OF NON-DEBARMENT: Individual or Entity Owning Greater than 50 Percent of Organization				
Section A (Check the Box that applies)				
	Below is the name and address of the stockholder in the corporation who owns more than 50 percent of its voting stock, or of the partner in the partnership who owns more than 50 percent interest therein, or of the member of the limited liability company owning more than 50 percent interest therein, as the case may be.			
Name of Individual or Organization				
Address				
	OR			
	No one stockholder in the corporation owns more than 50 percent of its voting stock, or no partner in the partnership owns more than 50 percent interest therein, or no member in the limited liability company owns more than 50 percent interest therein, as the case may be.			
Section B (Skip if no Business entity is listed in Section A above)				
	Below is the name and address of the stockholder in the corporation who owns more than 50 percent of the voting stock of the organization's parent entity, or of the partner in the partnership who owns more than 50 percent interest in the organization's parent entity, or of the member of the limited liability company owning more than 50 percent interest in organization's parent entity, as the case may be.			
Stockholder/Partner/Member Owning Greater Than 50 Percent of Parent Entity				
Address				
OR				
	No one stockholder in the parent entity corporation owns more than 50 percent of its voting stock, no partner in the parent entity partnership owns more than 50 percent interest therein, or no member in the parent entity limited liability company owns more than 50 percent interest therein, as the case may be.			

	Section C – Part III Certification						
from contracting with a federal agency owns greater than 50 percent of the <b>Organization</b> <b>listed above in Part I</b> or, if applicable, owns greater than 50 percent of a parent entity of <i>(name of organization)</i> . I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that the ("OWNER") is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the date of contract award "OWNER" to notify the "OWNER" in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the "OWNER", permitting the "OWNER" to declare any contract(s) resulting from this certification void and unenforceable.							
Full Name (Print):		Title:					
Signature:		Date:					

Part IV – CERTIFICATION OF Non-Debarment: Contractor – Controlled Entities					
	S(	ection A			
	Below is the name a	nd address of the corporation(s) in which the			
	Organization listed	in Part I owns more than 50 percent of			
	voting stock, or of the	e partnership(s) in which the <b>Organization</b>			
	listed in Part I owns	more than 50 percent interest therein, or of			
	the limited liability co	mpany or companies in which the			
	Organization listed	above in Part I owns more than 50 percent			
	interest therein as the case may be				
Name of E	Business Entity	Business Address			
**Add additional s	heets if necessary**				
OR					
	The Organization listed above in Part I does not own greater				
	than 50 percent of th	e voting stock in any corporation and does			
	not own greater than	50 percent interest in any partnership or			
	any limited liability company.				

Section B (sl	kip if no business en	tities are listed in Section A of Part IV)		
	Below are the names and addresses of any entities in which an entity listed in Part III A owns greater than 50 percent of the voting stock (corporation) or owns greater than 50 percent interest (partnership or limited liability company).			
Name of Busine by Entity Listed	ss Entity Controlled in Section A of Part IV	Business Address		
**Add additional S	heets if necessary**			
OR				
No entity listed in Part III A owns greater than 50 percent of the voting stock in any corporation or owns greater than 50 percent interest in any partnership or limited liability company.				

# Section C – Part IV Certification of Non-Debarment

I hereby certify that the <b>Organization listed above in Part I</b> does not own greater
than 50 percent of any entity that that is debarred by the federal government from
contracting with a federal agency and, if applicable, does not own greater than 50
percent of any entity that in turns owns greater than 50 percent of any entity
debarred by the federal government from contracting with a federal agency. I
further acknowledge: that I am authorized to execute this certification on behalf of
the above-named organization; that the ("OWNER") is relying on the information
contained herein and that I am under a continuing obligation from the date of this
certification through the date of contract award by "OWNER" to notify "OWNER"
in writing of any changes to the information contained herein; that I am aware that
it is a criminal offense to make a false statement or misrepresentation in this
certification, and if I do so, I am subject to criminal prosecution under the law and
that it will constitute a material breach of my agreement(s) with the "OWNER",
permitting the "OWNER" to declare any contract(s) resulting from this certification
void and unenforceable.

Full Name (Print):	Title:	
Signature:	Date:	

# FEDERAL AND STATE NON-DEBARMENT CERTIFICATIONS

I, \_\_\_\_\_\_\_ of the city of \_\_\_\_\_\_\_, in the County of \_\_\_\_\_\_\_ and the State of \_\_\_\_\_\_\_, of full age, certify that the entity listed on the form and/or any person or company employed by this entity, are not presently on the following:
New Jersey Department of Treasury – Consolidated Debarment Report
New Jersey Department of Labor – Prevailing Wage Debarment List
Federal Debarred Vendor List – System for Award Management (SAM.gov)

Authorized Agent: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

# CERTIFICATION OF INSURANCE STATEMENT

The Bidder fully understands the Owner's insurance requirements as stated in the Bid Documents and agrees to provide all insurance required by these documents at award of contract.

COMPANY NAME

BIDDER (Signature)

BIDDER (Print Name)

Note: Failure to sign this document may result in the rejection of your Proposal.

CERTIFICATION OF INSURANCE STATEMENT

# SAMPLE INSURANCE FORMS.xis: SCHOOL DISTRICT

CERTIFICATE OF LIABILITY INSURANCE	DATE (MM/DD/YYYY) 01/01/03	
PRODUCER: XYZ Insurance 123 Any Street Anywhere, NJ 12345	THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.	
	INSURERS AFFORDING COVERAGE	
INSURED	INSURER A:	
School District	INSURER 8:	
123 State St	INSURER C:	
Anywhere, NJ 12345	INSURER D:	
	INSURER E:	

#### COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS, AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

insr Ltri	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS		
	GENERAL LIABILITY		01/01/03	01/01/04	EACH OCCURRENCE	\$ 1,000,000	
	COMMERCIAL GENERAL LIABILTY				FIRE DAMAGE	\$	
	CLAIMS MADE				MED EXP	\$	
	AUTOMOBILE LIABILTY		01/01/03	01/01/04	COMBINED SINGLE LIMIT	\$ 1,000,000	
	ALL OWNED AUTOS			-	BODILY INJURY	\$	
	SCHEDOLED AUTOS						
	NON-OWNED AUTOS				(per accident)	\$	
	• *				PROPERTY DAMAGE	\$	
	GARAGE LIABILTY				AUTO ONLY - EA ACCIDENT	\$ 1	
	ANY AUTO	$C \wedge$			OTHER THAN AUTO ONLY:	\$	
		SA			EACH ACCIDENT	\$	
					AGGREGATE	\$	
	EXCESS LIABILITY		01/01/03	01/01/04	EACH OCCURRENCE	\$ 4,000,000	
	✓ UMBRELLA FORM				AGGREGATE	\$	
	PROPERTY				STATED VALUE	\$ project cost	
	- BUILDER'S RISK		START OF CONSTRUCTION	END OF CONSTRUCTION			
	Builder's risk must be for Total	Project cost less	any excavations, fo	oundations, or othe	r structures normally ex	cluded.	
	WORKERS COMPENSATION AND		01/01/03	01/01/04	X WC STATUTORY LIMITS		
. 1	EMPLOYERS' LIABILITY				EL EACH ACCIDENT	\$ 500,000	
	•				EL DISEASE-POLICY LIMIT	\$	
					EL DISEASE-EA EMPLOYEE	\$	
-	OTHER				·.		
OESC	DESCRIPTION OF OPERATIONSA OCATIONSIVEHICI ESISPECIAL ITEMS						
THE OWNER, Architect, Construction Manager, THE STATE OF N.I. N.I DEPARTMENT OF EDUCATION N.I SCHOOLS DEVELOPMENT AUTHORITY AND N.I ECONOMIC DEVELOPMENT AUTHORITY							
AREI	ARE NAMED AS ADDITIONAL INSURED WITH RESPECT TO COMMERCIAL GENERAL LIABILITY, AUTOMOBILE LIABILITY, & BUILDER'S RISK AS						
LOSS	PAYEES AS THERE INTEREST MAY AP	PPEAR.			•		
locar			CAMORIA ATOM				
CEHI	FICALE HOLDER		SHOULD ANY OF TH	E ABOVE DESCORED O	OLICIES RE CANCELLED REEC	INF THE	

EXPIRATION DATE THEREOF, THE ISSUING COMPNAY WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT. BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES. AUTHORIZED REPRESENTATIVE

# **CERTIFICATION OF NO MATERIAL CHANGE OF CIRCUMSTANCES**

Bidder's Name:

Address:

- 1. A statement as to the financial ability, adequacy of plant equipment, organization and prior experience of the Bidder, as required by <u>N.J.S.A.</u> 18A:18A-28 has been submitted to the Department of Treasury within the last twelve (12) months preceding the date of opening of bids for this contract.
- 2. I certify, as required by N.J.S.A. 18A:18A-32, that there has been no material adverse change in the qualification except:

(Name and Title of Signer - Please print or type)

(Signature)

(Date)

CERTIFICATION OF NO MATERIAL CHANGE OF CIRCUMSTANCES

# **STATUS OF PRESENT CONTRACTS**

<ul> <li>PURSUANT TO N.J.A.C. 17:19-2.13, BIDDER DECLARES THE FOLLOWING WITH RESPECT TO ITS UNCOMPLETED CONTRACTS, ON ALL WORK, FROM WHATEVER SOURCE (PUBLIC AND PRIVATE), BOTH IN NEW JERSEY AND FROM OTHER GOVERNMENTAL JURISDICTIONS.</li> <li>Each classified bidder's aggregate rating shall be calculated in accordance with formula prescribed by N.J.A.C. 17:19-28</li> <li>Calculations shall be based on Bidder's base bid amount only at time of bid or total amount of base bid and accepted Alternate Bids at time of Award.</li> </ul>								
Entity	EntityProject TitleOriginal ContractUncompletedName and Telephone Number ofAmountAmountAmount As of BidParty To Be Contacted From EntityOpening DateFor Verification							

Sworn and Subscribed to before me

this\_\_\_\_\_day of\_\_\_\_\_, 20\_\_\_

BIDDER

Notary Public

(Print and Signature)

## PERFORMANCE RECORD

How many years has your organization been in business as a Contractor under your present business name? \_\_\_\_\_

How many years experience in construction work has your organization had: (a) As a Prime contractor? \_\_\_\_\_ (b) As a subcontractor? \_\_\_\_\_

What is the construction experience of the principal individuals of your organization?

Individual's Name	Present Position or Office	Years of Constr. Experience	Magnitude and Type of Work	In What Capacity

Have you ever failed to complete any work contracted to you?

If so, where and why? \_\_\_\_\_

Has any officer or partner of your organization ever failed to complete a construction contract handled in its own name?

If so, state name of individual, name of owner, location and type of project and reason for the failure to complete.

# PERFORMANCE RECORD (Continued)

List of all contracts completed by you.

Name of Owner	Name & Location of Project/ Type of Work	Prime or Sub- Contractor	Architect or Engineer in Charge for Owner	Contract Price (Omit Cost)	Date Completed	Was* Time Extension Necessary	Were any Penalties Imposed	Were* Liens Claims or Stop Notice Filed

\*Explain "Yes" answers.

# PERFORMANCE RECORD <u>CERTIFICATION</u>

Explanation of details in connection with non-completion of contracts, time extensions, penalties imposed, labor troubles experience, liens, termination of contracts, poor performance, debarment, claims and notices filed against contracts.

The information above is true and complete to the best of my knowledge and belief.

(Name of Organization)

(Signature)

(Title)

STATE OF COUNTY OF

\_\_\_\_\_, being duly sworn to law, deposes and says that it is authorized to make this affidavit for, and on behalf of, the individual, partnership or corporation

herein first named as the Bidder, that deponent is familiar with the books of the said Bidder and that the foregoing statement is a true and accurate statement taken from the books of said Bidder of such financial condition as of the date herein first named; that the answers to the foregoing interrogatories are true and correct.

Subscribed and sworn to before me

This \_\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

) )ss.

)

(Signature)

(Seal) Notary Public of New Jersey/ Specify Other State My Commission Expires\_\_\_\_\_, 20\_\_\_.

# C. 271 POLITICAL CONTRIBUTION DISCLOSURE FORM Contractor Instructions

Business entities (contractors) receiving contracts from a public agency that are NOT awarded pursuant to a "fair and open" process (defined at <u>N.J.S.A.</u> 19:44A-20.7) are subject to the provisions of <u>N.J.S.A.</u> 19:44A-20.26. This law provides that 10 days prior to the award of such a contract, the contractor shall disclose contributions to:

- any continuing political committee (a.k.a., political action committee)
- any candidate committee of a candidate for, or holder of, an elective office:
  - of the public entity awarding the contract
  - o of that county in which that public entity is located
  - of another public entity within that county
  - or of a legislative district in which that public entity is located or, when the public entity is a county, of any legislative district which includes all or part of the county

The disclosure must list reportable contributions to any of the committees that exceed \$200 per election cycle that were made during the 12 months prior to award of the contract. See <u>N.J.S.A.</u> 19:44A-8 and 19:44A-16 for more details on reportable contributions.

<u>N.J.S.A.</u> 19:44A-20.26 itemizes the parties from whom contributions must be disclosed when a business entity is not a natural person. This includes the following:

- individuals with an "interest" ownership or control of more than 10% of the profits or assets of a business entity or 10% of the stock in the case of a business entity that is a corporation for profit
- all principals, partners, officers, or directors of the business entity or their spouses
- any subsidiaries directly or indirectly controlled by the business entity
- IRS Code Section 527 New Jersey based organizations, directly or indirectly controlled by the business entity and filing as continuing political committees, (PACs).

When the business entity is a natural person, "a contribution by that person's spouse or child, residing therewith, shall be deemed to be a contribution by the business entity." [N.J.S.A. 19:44A-20.26(b)] The contributor must be listed on the disclosure.

Any business entity that fails to comply with the disclosure provisions shall be subject to a fine imposed by ELEC in an amount to be determined by the Commission which may be based upon the amount that the business entity failed to report.

The enclosed list of agencies is provided to assist the contractor in identifying those public agencies whose elected official and/or candidate campaign committees are affected by the disclosure requirement. It is the contractor's responsibility to identify the specific committees to which contributions may have been made and need to be disclosed. The disclosed information may exceed the minimum requirement.

The enclosed form, a content-consistent facsimile, or an electronic data file containing the required details (along with a signed cover sheet) may be used as the contractor's submission and is disclosable to the public under the Open Public Records Act.

The contractor must also complete the attached Ownership Disclosure Certification. This will assist the agency in meeting its obligations under the law. **NOTE: This section does not apply to Board of Education contracts.** 

# **C. 271 POLITICAL CONTRIBUTION DISCLOSURE FORM**

Required Pursuant To N.J.S.A. 19:44A-20.26

#### This form or its permitted facsimile must be submitted to the local unit no later than 10 days prior to the award of the contract.

#### Part I – Vendor Information

Vendor Name	:		
Address:			
City:		State:	Zip:

The undersigned being authorized to certify, hereby certifies that the submission provided herein represents compliance with the provisions of <u>N.J.S.A.</u> 19:44A-20.26 and as represented by the Instructions accompanying this form.

Signature

Printed Name

Title

# Part II – Contribution Disclosure

Disclosure requirement: Pursuant to <u>N.J.S.A.</u> 19:44A-20.26 this disclosure must include all reportable political contributions (more than \$200 per election cycle) over the 12 months prior to submission to the committees of the government entities listed on the form provided by the local unit.

Check here if disclosure is provided in electronic form.

Contributor Name	Recipient Name	Date	Dollar Amount
			\$

Check here if the information is continued on subsequent page(s)

## List of Agencies with Elected Officials Required for Political Contribution Disclosure N.J.S.A. 19:44A-20.26

# **County Name: Atlantic**

State: Governor, and Legislative Leadership Committees Legislative District #s: 1, 2, & 9 State Senator and two members of the General Assembly per district.

State Senator and two memoers of the General Asseniory p

## County:

Freeholders	County Clerk	Sheriff
County Executive	Surrogate	

Municipalities (Mayor and members of governing body, regardless of title):

Absecon City	Estell Manor City	Mullica Township
Atlantic City	Folsom Borough	Northfield City
Brigantine City	Galloway Township	Pleasantville City
Buena Borough	Hamilton Township	Port Republic City
Buena Vista Township	Hammonton Town	Somers Point City
Corbin City	Linwood City	Ventnor City
Egg Harbor City	Longport Borough	Weymouth Township
Egg Harbor Township	Margate City	

#### Boards of Education (Members of the Board):

Absecon City	Folsom Borough	Mainland Regional
Atlantic City	Galloway Township	Mullica Township
Buena Regional	Greater Egg Harbor Regional	Northfield City
Egg Harbor City	Hamilton Township	Pleasantville City
Egg Harbor Township	Hammonton Town	Somers Point City
Estell Manor City	Longport	Weymouth Township

Fire Districts (Board of Fire Commissioners):

Buena Borough Fire District No. 1 Buena Borough Fire District No. 2 Buena Vista Township Fire District No. 1 Buena Vista Township Fire District No. 2 Buena Vista Township Fire District No. 3 Buena Vista Township Fire District No. 4 Buena Vista Township Fire District No. 5

## STATEMENT OF OWNERSHIP DISCLOSURE N.J.S.A. 52:25-24.2 (P.L. 1977, c.33, as amended by P.L. 2016, c.43)

This statement shall be completed, certified to, and included with all bid and proposal submissions. Failure to submit the required information is cause for automatic rejection of the bid or proposal.

Name of Organization:
Organization Address:
<b><u>Part</u></b> I Check the box that represents the type of business organization:
Sole Proprietorship (skip Parts II and III, execute certification in Part IV)
Non-Profit Corporation (skip Parts II and III, execute certification in Part IV)
For-Profit Corporation (any type)
Partnership Limited Partnership Limited Liability Partnership (LLP)
Other (be specific):

# <u>Part II</u>

The list below contains the names and addresses of all stockholders in the corporation who own 10 percent or more of its stock, of any class, or of all individual partners in the partnership who own a 10 percent or greater interest therein, or of all members in the limited liability company who own a 10 percent or greater interest therein, as the case may be. (COMPLETE THE LIST BELOW IN THIS SECTION)

# OR

No one stockholder in the corporation owns 10 percent or more of its stock, of any class, or no individual partner in the partnership owns a 10 percent or greater interest therein, or no member in the limited liability company owns a 10 percent or greater interest therein, as the case may be. (SKIP TO PART IV)

(Please attach additional sheets if more space is needed):

Name of Individual or Business Entity	Address

# <u>Part III</u> DISCLOSURE OF 10% OR GREATER OWNERSHIP IN THE STOCKHOLDERS, PARTNERS OR LLC MEMBERS LISTED IN PART II

If a bidder has a direct or indirect parent entity which is publicly traded, and any person holds a 10 percent or greater beneficial interest in the publicly traded parent entity as of the last annual federal Security and Exchange Commission (SEC) or foreign equivalent filing, ownership disclosure can be met by providing links to the website(s) containing the last annual filing(s) with the federal Securities and Exchange Commission (or foreign equivalent) that contain the name and address of each person holding a 10% or greater beneficial interest in the publicly traded parent entity, along with the relevant page numbers of the filing(s) that contain the information on each such person. Attach additional sheets if more space is needed.

Website (URL) containing the last annual SEC (or foreign equivalent) filing	Page #'s

**Please list** the names and addresses of each stockholder, partner or member owning a 10 percent or greater interest in any corresponding corporation, partnership and/or limited liability company (LLC) listed in Part II **other than for any publicly traded parent entities referenced above**. The disclosure shall be continued until names and addresses of every non-corporate stockholder, and individual partner, and member exceeding the 10 percent ownership criteria established pursuant to <u>N.J.S.A.</u> 52:25-24.2 has been listed. **Attach additional sheets if more space is needed.** 

Stockholder/Partner/Member and Corresponding Entity Listed in Part II	Address

# Part IV Certification

I, being duly sworn upon my oath, hereby represent that the foregoing information and any attachments thereto to the best of my knowledge are true and complete. I acknowledge: that I am authorized to execute this certification on behalf of the bidder/proposer; that the *<name of contracting unit*> is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the completion of any contracts with *<type of contracting unit*> to notify the *<type of contracting unit*> in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the, permitting the *<type of contracting unit*> to declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print):	Title:	
Signature:	Date:	

#### AMERICANS WITH DISABILITIES ACT OF 1990 Equal Opportunity for Individuals with Disability

The contractor and the Board of Education (hereafter "owner") do hereby agree that the provisions of Title 11 of the Americans With Disabilities Act of 1990 (the "Act")

(42 U.S.C. S121 01 et seq.), which prohibits discrimination on the basis of disability by public entities in all services, programs, and activities provided or made available by public entities, and the rules and regulations promulgated pursuant there unto, are made a part of this contract. In providing any aid, benefit, or service on behalf of the owner pursuant to this contract, the contractor agrees that the performance shall be in strict compliance with the Act. In the event that the contractor, its agents, servants, employees, or subcontractors violate or are alleged to have violated the Act during the performance of this contract, the contractor shall defend the owner in any action or administrative proceeding commenced pursuant to this Act. The contractor shall indemnify, protect, and save harmless the owner, its agents, servants, and employees from and against any and all suits, claims, losses, demands, or damages, of whatever kind or nature arising out of or claimed to arise out of the alleged violation. The contractor shall, at its own expense, appear, defend, and pay any and all charges for legal services and any and all costs and other expenses arising from such action or administrative proceeding or incurred in connection therewith. In any and all complaints brought pursuant to the owner's grievance procedure, the contractor agrees to abide by any decision of the owner which is rendered pursuant to said grievance procedure. If any action or administrative proceeding results in an award of damages against the owner, or if the owner incurs any expense to cure a violation of the ADA which has been brought pursuant to its grievance procedure, the contractor shall satisfy and discharge the same at its own expense.

The owner shall, as soon as practicable after a claim has been made against it, give written notice thereof to the contractor along with full and complete particulars of the claim, If any action or administrative proceeding is brought against the owner or any of its agents, servants, and employees, the *owner shall* expeditiously forward or have forwarded to the contractor every demand, complaint, notice, summons, pleading, or other process received by the owner or its representatives.

It is expressly agreed and understood that any approval by the owner of the services provided by the contractor pursuant to this contract will not relieve the contractor of the obligation to comply with the Act and to defend, indemnify, protect, and save harmless the owner pursuant to this paragraph.

It is further agreed and understood that the owner assumes no obligation to indemnify or save harmless the contractor, its agents, servants, employees and subcontractors for any claim which may arise out of their performance of this Agreement. Furthermore, the contractor expressly understands and agrees that the provisions of this indemnification clause shall in no way limit the contractor's obligations assumed in this Agreement, nor shall they be construed to relieve the contractor from any liability, nor preclude the owner from taking any other actions available to it under any other provisions of the Agreement or otherwise at law.

Name of Company	
Authorized Agent	
Title or Position	
Signature	Date

#### MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE N.J.S.A. 10:5-31 et seq. (P.L.1975, c.127) N.J.A.C. 17:27-1.1 et seq. CONSTRUCTION CONTRACTS

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

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affection or sexual orientation and gender identity or expression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity 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 Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The contractor or subcontractor, where applicable 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 age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor will send to each labor union, with which it has a collective bargaining agreement, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under this act and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer, pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

When hiring or scheduling workers in each construction trade, the contractor or subcontractor agrees to make good faith efforts to employ minority and women workers in each construction trade consistent with the targeted employment goal prescribed by N.J.A.C. 17:27-7.2; provided, however, that the Dept. of LWD, Construction EEO Monitoring Program, may, in its discretion, exempt a contractor or subcontractor from compliance with the good faith procedures prescribed by the following provisions, A, B, and C, as long as the Dept. of LWD, construction EEO Monitoring Program is satisfied that the contractor or subcontractor is employing workers provided by a union which provides evidence, in accordance with standards prescribed by the Dept. of LWD, Construction EEO Monitoring Program, that its percentage of active "card carrying" members who are minority and women workers is equal to or greater than the targeted employment goal established in accordance with N.J.A.C 17:27-7.2. The contractor or subcontractor agrees that a good faith effort shall include compliance with the following procedures:

(A) If the contractor or subcontractor has a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor shall, within three business days of the contract award, seek assurances from the union that it will cooperate with the contractor or subcontractor as it fulfills its affirmative action obligations under this contract and in accordance with the rules promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et seq., as supplemented and amended from time to time and the American with Disabilities Act. If the contractor or subcontractor is unable to obtain said assurances from the construction trade union at least five business days prior to the commencement of construction work, the contractor or subcontractor agrees to afford equal employment opportunities minority and women workers directly, consistent with this chapter. If the contractor is unable to aconstruction trade union, regardless of whether the union has provided said assurances, indicates a significant possibility that the trade union will not refer sufficient minority and women workers consistent with affording equal employment opportunities as specified in this chapter, the contractor or subcontractor agrees to be prepared to provide such opportunities to minority and women workers directly, consistent (B) below; and the contractor or subcontractor further agrees to take said action immediately if it determines that the union is not referring minority and women workers consistent with the equal employment opportunity goals set forth in this chapter.

#### EXHIBIT B (Continued)

- (B) If good faith efforts to meet targeted employment goals have not or cannot be met for each construction trade by adhering to the procedures of (A) above, or if the contractor does not have a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor agrees to take the following actions:
  - To notify the public agency compliance officer, the Dept. of LWD, Construction EEO Monitoring Program, and minority and women referral organizations listed by the Division pursuant to N.J.A.C. 17:27-5.3, of its workforce needs, and request referral of minority and women workers;
  - 2) To notify any minority and women workers who have been listed with it as awaiting available vacancies;
  - Prior to commencement of work, to request that the local construction trade union refer minority and women workers to fill job openings, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade;
  - 4) To leave standing requests for additional referral to minority and women workers with the local construction trade union, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade, the State Training and Employment Service and other approved referral sources in the area;
  - 5) If it is necessary to lay off some of the workers in a given trade on the construction site, layoffs shall be conducted in compliance with the equal employment opportunity and nondiscrimination standards set forth in this regulation, as well as with applicable Federal and State court decisions;
  - 6) To adhere to the following procedure when minority and women workers apply or are referred to the contractor or subcontractor:
    - i. The contractor or subcontractor shall interview the referred minority or women worker.
    - ii. If said individuals have never previously received any document or certification signifying a level of qualification lower than that required in order to perform the work of the construction trade, the contractor or subcontractor shall in good faith determine the qualifications of such individuals. The contractor or subcontractor shall hire or schedule those individuals who satisfy appropriate qualification standards in conformity with the equal employment opportunity and non-discrimination principles set forth in this chapter. However, a contractor or subcontractor shall determine that the individual at least possesses the requisite skills, and experience recognized by a union, apprentice program or a referral agency, provided the referral agency is acceptable to the Dept. of LWD, Construction EEO Monitoring Program. If necessary, the contractor or subcontractor shall hire or schedule minority and women workers who qualify as trainees pursuant to these rules. All of the requirements, however, are limited by the provisions of (C) below.
    - iii. The name of any interested women or minority individual shall be maintained on a waiting list, and shall be considered for employment as described in (i) above, whenever vacancies occur. At the request of the Dept. of LWD, Construction EEO Monitoring Program, the contractor or subcontractor shall provide evidence of its good faith efforts to employ women and minorities from the list to fill vacancies.
    - iv. If, for any reason, said contractor or subcontractor determines that a minority individual or a woman is not qualified or if the individual qualifies as an advanced trainee or apprentice, the contractor or subcontractor shall inform the individual in writing of the reasons for the determination, maintain a copy of the determination in its files, and send a copy to the public agency compliance officer and to the Dept. of LWD, Construction EEO Monitoring Program.
  - 7) To keep a complete and accurate record of all requests made for the referral of workers in any trade covered by the contract, on forms made available by the Dept. of LWD, Construction EEO Monitoring Program upon request.
- (C) The contractor or subcontractor agrees that nothing contained in (B) above shall preclude the contractor or subcontractor from complying with the union hiring hall or apprenticeship policies in any applicable collective bargaining agreement or union hiring hall arrangement, and, where required by custom or agreement, it shall send journeymen and trainees to the union for referral, or to the apprenticeship program for admission, pursuant to such agreement or arrangement. However, where the practices of a union or apprenticeship program will result in the exclusion of minorities and women or the failure to refer minorities and women consistent with the targeted county employment goal, the contractor or subcontractor shall consider for employment persons referred pursuant to (B) above without regard to such agreement or arrangement; provided further, however, that the contractor or subcontractor shall not be required to employ women and minority advanced trainees and trainees in numbers which

#### EXHIBIT B (Continued)

result in the employment of advanced trainees and trainees as a percentage of the total workforce for the construction trade, which percentage significantly exceeds the apprentice to journey worker ratio specified in the applicable collective bargaining agreement, or in the absence of a collective bargaining agreement, exceeds the ration established by practice in the area for said construction trade. Also, the contractor or subcontractor agrees that, in implementing the procedures of (B) above, it shall, where applicable, employ minority and women workers residing within the geographical jurisdiction of the union.

After notification of award, but prior to signing a construction contract, the contractor shall submit to the public agency compliance officer and the Dept. of LWD, Construction EEO Monitoring Program an initial project workforce report (Form AA-201) electronically provided to the public agency by the Dept. of LWD, Construction EEO Monitoring Program, through its website, for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7. The contractor also agrees to submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of this contract to the Dept. of LWD, Construction EEO Monitoring Program, and to the public agency compliance officer.

The contractor agrees to cooperate with the public agency in the payment of budgeted funds, as is necessary, for onthe-job and/or off-the-job programs for outreach and training of minorities and women.

(D) The contractor and its subcontractors shall furnish such reports or other documents to the Dept. of LWD, Construction EEO Monitoring Program as may be requested by the Dept. of LWD, Construction EEO Monitoring Program from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Dept. of LWD, Construction EEO Monitoring Program for conducting a compliance investigation pursuant to N.J.A.C. 17:27-1.1 et seq.

(Revised: January, 2016)

Reviewed By:			

Title:

Company:\_\_\_\_\_

Signature: \_\_\_\_\_

Date:

# Sworn Contractor Certification; Qualifications and Credentials

Pursuant to N.J.S.A. 18A:7G-37, a pre-qualified contractor seeking to bid school facilities projects, and any subcontractors, that are required to be named under N.J.S.A. 18A:7G-1 et seq. shall, as a condition of bidding, submit this Sworn Contractor Certification regarding qualifications and credentials.

I,\_\_\_\_\_, the principal owner or officer of the company certify that the forging statements are true and our firm has the following qualifications and credentials:

- 1. A current, valid certificate of registration issued pursuant to "The Public Works Contractor Registration Act," N.J.S.A. 34:11-56:48 et seq. A copy of which is submitted with its bid;
- A current, valid Certificate of Authority to perform work in New Jersey issued by the Department of Treasury, a copy of which shall be attached to the certification form and is submitted with its bid;
- 3. A current valid contractor trade license required under applicable New Jersey Law for any specialty trade or specialty area in which the firm seeks to perform work, a copy of which is submitted with its bid;
- 4. During the term of the school facilities project, I as principal owner or officer of the company or corporation, as contractor, will have in place a suitable quality control and quality assurance program and an appropriate safety and health plan.
- 5. Certify that, at the time of bidding, the amount of the bid proposal and value of all of its outstanding incomplete contracts does not exceed the firm's existing aggregate rating limit.

Name of Company					-
Name of Owner or Offi	cer				-
Signature of Owner or	Officer				_
Notarized before me this	day of	Month	,	Year	
NOTARY PUBLIC SIG	NATURE	Print Name		f Notary Public	
My commission expires				,	
-SEAL-	Month		Day	Year	

# **EXHIBIT E-2**

Form of Contractor Certification and Consent

# <u>CONTRACTOR CERTIFICATION AND CONSENT</u> <u>UPON AWARD OF CONTRACT</u>

This certification should be completed by the Contractors engaged by the District for the School Facilities Project. This certification should be completed upon award by the District of the Construction Contract. If the District is undertaking multiple School Facilities Projects, this certification should be completed for each School Facilities Project.

School District:		
County:		
Project Name:		
DOE Project Number:		
SDA Grant Number:		
STATE OF	}	
COUNTY OF	}	
I,	, of the City of	, in the County of
to law on my oath, depos	and the State of of full age, e and sav that I am	being duly sworn according of the firm
of	, (the "Contractor") for the above-referenced School 1	Facilities Project (the "School
Facilities Project"). My f Facilities Project with full a by the District and that the Grant Agreement (the "Agre	irm has entered into a contract with the District (the uthority to do so. I understand that the School Facilitie District has entered into an Educational Facilities Conserved with the New Jersey Schools Development	he "District") for the School es Project is being undertaken onstruction and Financing Act Authority (the "Development
Authority"). Pursuant to	the Agreement, the Development Authority will pro-	ovide funding for the School

Facilities Project and the District will enter into contracts for the design and construction of such School Facilities Project. Terms not otherwise defined herein shall have their meaning as set forth in such Agreement.

I. The undersigned hereby swears and affirms to the following:

#### A. <u>No Gratuities</u>

The Contractor has not offered or tendered, directly or indirectly, the payment of any fee, commission or compensation of any kind or the granting of any gift or gratuity of any kind, whether or not in connection with the purchase, sale, or contract, to any person in the employ of the District, the Development Authority, the Financing Authority or the State of New Jersey (the "State") having any duties or responsibilities in connection with the purchase or acquisition of any property or services by the District, the Development Authority, the Financing Authority or State, by or on behalf of any seller, supplier or provider of services, who has made, negotiated, solicited or offered to make any contract to sell or furnish real or personal property or services to the District, the Development Authority, the Financing Authority or the State. I further understand that it is a violation of law to offer, pay, or give to any employee of the District, the Development Authority, the Financing Authority or the State any fees, commission, compensation, gift or gratuity for or because of any official act or a violation of any official duty. Any person who does so may be subject to punishment.

#### B. <u>No Collusion</u>

The Contractor has not directly or indirectly entered into any agreement, participated in any collusion, bid rigging or otherwise taken any action in restraint of free, competitive bidding in connection with the School Facilities Project; the prices in the bid have been arrived at independently without collusion, consultation, communication or agreement, for the purpose of restricting competition; the prices have not been knowingly disclosed directly or indirectly by the Contractor to any other bidder, unless otherwise required by law; and no attempt has been made by the Contractor to induce any other person or business entity to submit or not submit a bid for the purpose of restricting competition.

#### C. <u>No Discrimination</u>

The Contractor will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, gender or sexual orientation and has complied and will continue to comply with all State and Federal laws and Executive Orders respecting non-discrimination.

#### D. <u>Prevailing Wage, Contractor and Business Registration</u>

If applicable, the Contractor has complied and will continue to comply with the New Jersey Contractor Registration Act, <u>P.L.</u> 1999, <u>c</u>. 238, the business registration and use tax requirements of <u>N.J.S.A.</u> 52:32-44 as amended by <u>P.L.</u> 2004, <u>c</u>. 57, and the New Jersey Prevailing Wage Act, <u>P.L.</u> 1963, <u>c</u>. 150, and all amendments thereto, with respect to the School Facilities Project, the District, the Development Authority, the Financing Authority or the State, except those contracts not within the contemplation of these Acts. The Consultant shall not hire any Subconsultant to perform any work on the School Facilities Project who is listed or is on record in the Office of the Commissioner, Department of Labor, as having failed to pay prevailing wages in accordance with the provisions of the New Jersey Prevailing Wage Act.

#### E. <u>Prequalification</u>

The Contractor certifies that the Contractor and the Subcontractors in the four branches listed in N.J.S.A. 18A:18A-18 are prequalified by the Development Authority and that, since the latest prequalification application was filed by the Contractor with the Development Authority, there has been no change in any circumstance, condition or status that may adversely impact Contractor's prequalification with the Development Authority. The Contractor certifies that it will immediately report to the Development Authority any change in the information provided by the Contractor in its prequalification application currently on file with the Development Authority.

The Contractor certifies that it will immediately notify the Development Authority and the Bureau of Fiscal Oversight (PO Box 063, Trenton, NJ 08625) of any director, partner, officer, or employee of the Contractor, or of any shareholder owning 5% or more of the Contractor's stock, who:

- 1. Is the subject of investigation involving any violation of criminal law or other federal, state, or local law or regulation by any governmental agency; or
- 2 Is arrested, indicted or named as an unindicted co-conspirator in any indictment or other accusatory instrument; or
- 3. Is convicted of any crime under state or federal law, or of any disorderly persons offense or misdemeanor involving a business related offense.

#### Exhibit E-2

#### II. The undersigned hereby consents to the following:

#### A. <u>Consent to Documents</u>

The Contractor agrees and hereby consents to permit the Development Authority, the Financing Authority, the Department of Education, the Department of Community Affairs, other State agencies, the Bureau of Fiscal Oversight and their respective agents, representatives, consultants, subconsultants, contractors, subcontractors, and their agents and representatives (the "Project Team") access to ALL DOCUMENTS RELATED TO THE CONTRACT, including, but not limited to, the following:

- 1. Prequalifying information and work product.
- 2. All confidential memos and certifications required to be kept by any governmental agency, including, but not limited to, the Department of Community Affairs, the Department of Labor, the Department of Education, the Department of Environmental Protection, the Department of Treasury, the Division of Consumer Affairs, Licensing Boards, the Development Authority and the Financing Authority.
- 3. All documents required to be kept by the Contract, including, but not limited to, contracts, specifications, change orders, alternate submissions, approvals/rejections, unit prices, product data, time of performance schedules, construction photographs, quality control management and reports, value engineering information, up-to-date project accounting system, intermediate and final audits, as-builts, close-out documentation.
- 4. All documents related to the approval process for the School Facilities Project, including, but not limited to, project siting, land acquisition, surveys, and real estate documents (deeds, leases, and title report, including searches for easements, mortgages, judgments, liens, unpaid taxes, water & sewer, and property description by metes & bounds).
- 5. All documents related to the payment, in connection with the Contract, of professionals, including but not limited to surveyors, title abstractor/company, lawyers, appraisers, soils engineers, bond counsel, underwriters, financial and investment advisors, trustees, official printers, bond insurers.

#### B. <u>Right to Inspect and Audit</u>

The Contractor agrees to allow the Project Team upon request, at all reasonable times, to inspect and copy any and all of the above-described documents to the extent such documents are in its possession, custody or subject to its control. The Consultant agrees to make the requested documents available for inspection and copying within the State of New Jersey regardless of the location of the documents. The Contractor hereby waives any objection it might otherwise raise permitting the Project Team, including the Bureau of Fiscal Oversight and its authorized representatives to investigate, examine and inspect all activities related to this contract pursuant to <u>P.L.</u> 2000, <u>c</u>. 72. The Contractor further releases and holds harmless the Bureau of Fiscal Oversight and its authorized representatives, the Development Authority, the Financing Authority and the State of New Jersey.

All statements contained in the Contractor's bid/proposal and this Certification and Consent are true and correct; and all such statements have been made with full knowledge that the Development Authority, the Financing Authority and the State of New Jersey rely upon the truth of the statements contained in this Certification and Consent in providing payments to the District for the School Facilities Project pursuant to the Agreement.

Name of Principal:

Title:

Signature:

Date:

# PRIOR NEGATIVE EXPERIENCE QUESTIONNAIRE (N.J.S.A 18A:18A-4)

1. Within the past ten (10) years, have you been found, through either court adjudication, arbitration, mediation, or other contractually stipulated alternate dispute resolution mechanism, to have failed to provide or perform goods or services; or failed to complete the contract in a timely manner; or otherwise performed unsatisfactorily under a prior contract with a Board of Education or with the New Jersey Economic Development Authority/New Jersey Schools Development Authority?

\_\_\_\_\_yes \_\_\_\_\_no If yes, please explain:

2. Within the past ten (10) years, have you defaulted on a contract, thereby requiring a Board of Education or the New Jersey Economic Development Authority/New Jersey Schools Development Authority to utilize the services of another contractor to provide the goods or perform the services or to correct or complete the contract?

 _yes	 _no	If yes, please explain:

3. Within the past ten (10) years, have you defaulted on a contract, thereby requiring a Board of Education or the New Jersey Economic Development Authority/New Jersey Schools Development Authority to look to your surety for completion of the contract or tender of the costs of completion?

yes	nc	no If yes, please explain:	

PRIOR NEGATIVE EXPERIENCE QUESTIONNAIRE FORM

4. Within the past ten (10) years, have you been debarred or suspended from contracting with any of the agencies or departments of the executive branch of the State of New Jersey at the time of contract award, whether the action was based on experience with a Board of Education, the New Jersey Economic Development Authority/New Jersey Schools Development Authority, or any other entity?

yes		no	If yes, please explain:	
I hereby certify that the above statements	are true and ac	ccurate	as of this	day of
, 20				
Name of Contractor				
Subscribed and sworn to before me	)			
	·			
	(Sig	gnature	)	
(Seal) Notary Public of New Jersey/				
Specify Other State My Commission Expires	_, 20			

# THIS FORM MUST BE COMPLETED, SIGNED, NOTARIZED, AND SUBMITTED WITH BID

# AFFIDAVIT REGARDING LIST OF DEBARRED, SUSPENDED OR DISQUALIFIED BIDDERS

STATE OF NEW JER	SEY/	/
	Specify, if Other	
COUNTY OF		
I,		, $\mathbf{\phi}$ the (City, Town, Borough) of
	, State of	, of full age, being duly sworn
according to law on	my oath depose and say that: I	am
of the firm of		_, the Bidder making the Proposal for the above
named Projects, and	that I executed the said Propos	al with full authority to do so; that said Bidder is
not at the time of th	ne making this bid included on t	the New Jersey State Treasurer's, the Economic
Development Author	prity's or the Federal Governme	nt's List of Debarred, Suspended or Disqualified
Bidders as a result o	f action taken by any State or Fe	ederal Agency.
		Name of Contractor
		By: (Signature of Authorized Representative)

Subscribed and sworn to before me this \_\_\_\_\_\_, 20\_\_\_\_, 20\_\_\_\_.

(Seal) Notary Public of New Jersey/ Specify Other State My Commission Expires \_\_\_\_\_, 20\_\_\_.

### SUPPLEMENTAL CONDITIONS PURSUANT TO THE EDUCATIONAL FACILITIES CONSTRUCTION AND FINANCING ACT SECTION 15 GRANT AGREEMENT AND ACKNOWLEDGMENT OF RECEIPT

- 1. This School Facilities Project is being funded in part by funds from the New Jersey Schools Development Authority pursuant to the terms of an Agreement between the District and the New Jersey Schools Development Authority. All Contracted Parties and subcontractors working on the Project agree to be bound by the terms of this Agreement which is incorporated herein by reference.
- 2. <u>Grant Agreement § 3.3.1.1</u> The District shall insert in all Contracts with all Contracted Parties, and shall cause all Contractors and Consultants to insert into all their Contracts with all Subconsultants and Subcontractors, a clause stating that the Contracted Party, its Subconsultants or Subcontractors may be debarred, suspended or disqualified from contracting and/or working on the School Facilities Project if found to have committed any of the acts listed in N.J.A.C. 17:19-4.1.

17:19-4.1 Causes for debarment of a firm(s) or an individual(s)

- (a) In the public interest, the DPMC may debar a firm or an individual for any of the following causes:
  - 1. Commission of a criminal offense incident to obtaining or attempting to obtain a public or private contract, or subcontract thereunder, or in the performance of such contract or subcontract;
  - 2. Civil or criminal violation of the Federal Organized Crime Control Act of 1970 or the New Jersey Racketeer Influenced and Corrupt Organizations Act, N.J.S.A. 2C:41-1 et seq., or the commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, perjury, false swearing, receiving stolen property, obstruction of justice or any other offense indicating a lack of business integrity or honesty;
  - 3. Violations of the Federal or any state antitrust statutes, or of the Federal Anti-Kickback Act (18 U.S.C. § 874, 40 U.S.C. § 276c);
  - 4. Violations of any of the laws governing the conduct of elections of the Federal government, any state or its political subdivisions;
  - 5. Violation of the "Law Against Discrimination" (P.L. 1945, c.169, N.J.S.A. 10:5-1 et seq., as supplemented by P.L. 1975, c.127), or of the act banning discrimination in public work employment (N.J.S.A. 10:2-1 et seq.), or of the act prohibiting discrimination by industries engaged in defense work in the employment of individuals therein (P.L. 1942, c.114, N.J.S.A. 10:1-10 et seq.);
  - 6. Violations of any laws governing hours of labor, minimum wage standards, prevailing wage standards, discrimination in wages or child labor;
  - 7. Violations of any laws governing the conduct of occupations or professions or regulated industries;
  - 8. Violations of any Federal or state laws that may bear upon a lack of responsibility or moral integrity;
  - 9. Willful failure to perform in accordance with contract specifications or within contractual time limits;
  - 10. A record of failure to perform or of unsatisfactory performance in accordance with the terms of one or more contracts, provided that such failure or unsatisfactory performance has occurred within a reasonable time preceding the determination to debar and was caused by acts within the control of the firm or the individual debarred;
  - 11. Violation of contractual or statutory provisions regulating contingent fees;
  - 12. Any other cause affecting responsibility as a State contractor of such serious and

compelling nature as may be determined by the DPMC to warrant debarment, including such conduct as may be prescribed by the laws or contracts enumerated in this section even if such conduct has not been or may not be prosecuted as violations of such laws or contracts;

- 13. Debarment or disqualification by any other agency of government;
- 14. Making any offer or agreement to pay or make payment of, either directly or indirectly, any fee, commission, compensation, gift, gratuity, or other thing of value of any kind to any State officer or employee of an agency of government with which such vendor transacts or offers or proposes to transact business, or to any member of the immediate family as defined by N.J.S.A. 52:13D-13i, of any such officer or employee of an agency of government, or any partnership, firm, or corporation with which they are employed or associated, or in which such officer or employee has an interest within the meaning of N.J.S.A. 52:13D-13g;
- 15. Failure by a vendor to immediately report to the Attorney General and to the Executive Commission on Ethical Standards in writing the solicitation of any fee, commission, compensation, gift, gratuity or other thing of value by any officer or employee of any State agency of government or special State officer or employee as defined by N.J.S.A. 52:13D-13;
- 16. Failure by a vendor to immediately report in writing, or obtain a waiver from the Executive Commission on Ethical Standards for, the direct or indirect undertaking of any private business, commercial or entrepreneurial relationship (including the selling of any interest in such vendor), regardless of whether the relationship is pursuant to employment, contract or other agreement, express or implied, with the following:
  - i. Any State officer or employee of any State agency of government or special State officer or employee as defined by N.J.S.A. 52:13D-13, having duties or responsibilities connected with the purchase, acquisition or sale of any property or services by or to any State agency of government or any instrumentality thereof; or
  - ii. Any firm or entity with which the State officer or employee of an State agency of government is employed or associated or has an interest in within the meaning of N.J.S.A. 52:13D-13g;
- 17. Influencing or attempting to influence or cause to be influenced, any officer or employee of any agency of government, in that officer's or employee's official capacity in any manner which might tend to impair the objectivity or independence of judgment of said officer or employee;
- 18. Causing or influencing or attempting to cause or influence, any State officer or employee of any State agency of government or special State officer or employee as defined by N.J.S.A. 52:13D-13, to use, or attempt to use, that officer or employee's official position to secure unwarranted privileges or advantages for the vendor or any other firm or individual; and/or
- 19. Agreeing with any agency of government to refrain from bidding on public works projects for reasons that, in the discretion of the Director, warrant debarment.
- 3. <u>Grant Agreement § 3.4</u> The Contractor and any and all subcontractors shall comply with the New Jersey Prevailing Wage Act, N.J.S.A. 34:11-56.52 et seq.
- 4. <u>Grant Agreement § 3.5</u> The Contractor shall comply with the anti-discrimination provisions of N.J.S.A. 10:2-1 et. seq., the New Jersey Law Against Discrimination, N.J.S.A. 10:5-1 et seq., N.J.A.C. 17:27-1.1 et seq. and N.J.A.C. 6A:7-1.8. The District and its Contracted Parties shall, in addition, agree by contract and guarantee to afford equal opportunity in performance of the Grant Agreement in accordance with an affirmative action program approved by the State Treasurer.

5. <u>Grant Agreement § 3.5.1</u> During the term, all contracts shall contain the following provisions:

The District and its Contracted Parties shall not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation or sex. The District and its Contracted Parties shall take affirmative action to ensure that such applicants are recruited and employed, that employees are treated during employment without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation or sex. 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 District and its Contracted Parties agree to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

- 6. <u>Grant Agreement § 3.5.2</u> The District and its Contracted Parties shall, in all solicitations or advertisements for employees placed by or on behalf of the District and its Contracted Parties state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation or sex.
- 7. <u>Grant Agreement §3.7</u> The District shall include a provision in each contract awarded by the District in connection with the School Facilities Project which states that the contracts are assignable to the New Jersey Schools Development Authority.
- 8. <u>Grant Agreement §5.3.2.4</u> The District shall include in all contracts a provision requiring Contracted Parties to permit the New Jersey Schools Development Authority and the Unit of Fiscal Integrity and their agents to investigate, audit, examine and inspect in such manner and at such times as the New Jersey Schools Development Authority and the Unit of Fiscal Integrity deem necessary.
- 9. The Contracted Parties, its subconsultants or subcontractors shall send notices to each labor union or representative of workers with which the Contracted Parties, their subconsultants or subcontractors have a collective bargaining agreement or other contract or undertaking advising the labor union or workers' representative of the Contracted Parties, its subconsultants or subcontractors' commitments under this Agreement and shall post copies of the notice in conspicuous places, available to employees and applicants for employment.

Company

Signature

Name/Title (type or print clearly)

Date

# AFFIRMATIVE ACTION COMPLIANCE NOTICE N.J.S.A. 10:5-31 and N.J.A.C. 17:27

# GOODS AND SERVICES CONTRACTS (INCLUDING PROFESSIONAL SERVICES)

This form is a summary of the successful bidder's requirement to comply with the requirements of N.J.S.A. 10:5-31 and N.J.A.C. 17:27-1 et seq.

The successful bidder shall submit to the public agency, after notification of award but prior to execution of this contract, one of the following three documents as forms of evidence:

(a) A photocopy of a valid letter that the contractor is operating under an existing Federally approved or sanctioned affirmative action program (good for one year from the date of the letter);

(b) A photocopy of a Certificate of Employee Information Report approval, issued in accordance with N.J.A.C. 17:27-4;

OR

OR

(c) A photocopy of an Employee Information Report (Form AA302) provided by the Division and distributed to the public agency to be completed by the contractor in accordance with N.J.A.C. 17:27-4.

The successful vendor may obtain the Affirmative Action Employee Information Report (AA302) from the contracting unit during normal business hours.

The successful vendor(s) must submit the copies of the AA302 Report to the Division of Contract Compliance and Equal Employment Opportunity in Public Contracts (Division). The Public Agency copy is submitted to the public agency, and the vendor copy is retained by the vendor.

The undersigned vendor certifies that he/she is aware of the commitment to comply with the requirements of N.J.S.A. 10:5-31 and N.J.A.C. 17:27.1 et seq. and agrees to furnish the required forms of evidence.

The undersigned vendor further understands that his/her bid shall be rejected as non-responsive if said contractor fails to comply with the requirements of N.J.S.A. 10:5-31 and N.J.A.C. 17:27-1 et seq.

COMPANY:	SIGNATURE:
PRINT NAME:	TITLE:

DATE: \_\_\_\_\_

Form AA302 Rev. 02/22

#### STATE OF NEW JERSEY

Division of Purchase & Property Contract Compliance Audit Unit

# EEO Monitoring Program

#### EMPLOYEE INFORMATION REPORT

IMPORTANT-READ INSTRUCTIONS CAREFULLY BEFORE COMPLETING FORM. FAILURE TO PROPERLY COMPLETE THE ENTIRE FORM AND TO SUBMIT THE REQUIRED \$150.00 FEE MAY DELAY ISSUANCE OF YOUR CERTIFICATE. DO NOT SUBMIT EEO-1 REPORT FOR SECTION B, ITEM 11. For Instructions on completing the form, go to: https://www.nj.gov/treasury/contract\_compliance/documents/pdf/forms/aa302ins.pdf

	SE	CTION A - COMP	ANY IDENTIFI	CATION						
1. FID. NO. OR SOCIAL SECURITY	2. TYPE OF BUSINE	ESS 2. SERVICE □ . □ 5. OTHER □	3. WHOLESALE	3. TOTAL NO. EMPLOYEES IN THE ENTIRE COMPANY						
4. COMPANY NAME COMPANY E-MAIL										
5. STREET	CITY		COUNTY	STATE	:	ZIP CODE				
6. NAME OF PARENT OR AFFILIATED COMPANY (IF NONE, SO INDICATE) CITY STATE ZIP CODE										
7. CHECK ONE: IS THE COMPANY:	SINGLE-ESTAB	LISHMENT EMPLO	OYER [	MULTI-	ESTABLISHI	MENT EMPLOYER				
8. IF MULTI-ESTABLISHMENT 9. TOTAL NUMBER OF EMPLOYEES 10. PUBLIC AGENCY AWARDING C	AT ESTABLISHMENT	HE NUMBER OF WHICH HAS BEEN	AWARDED THE	ONTRACT						
		CITY	COUN	ТҮ	STATE	ZIP CODE				
Official Use Only	DATE RECEIVED	INAUG.DATE	ASSIG	NED CERTIF	FICATION N	UMBER				

**SECTION B - EMPLOYMENT DATA** 

11. Report all permanent, temporary and part-time employees ON YOUR OWN PAYROLL. Enter the appropriate figures on all lines and in all columns. Where there are no employees in a particular category, enter a zero. Include ALL employees, not just those in minority/non-minority categories, in columns 1, 2, & 3. DO NOT SUBMIT AN EEO-1 REPORT.

JOB CATEGORIES	ALL EMPLOY EES		PERMANENT MINORITY/NON-MINORITY EMPLOYEE BREAKDOWN												
	COL. 1	COL. 2	COL. 3		****	***** MALI	******	*		*******FEMALE******					
	Total	Male	Female												
	(Cols.2 &3)			BLACK	HISPANIC	AMER INDIAN	ASIAN	NON MIN	2 OR MORE RACES	BLACK	HISPANIC	AMER INDIAN	ASIAN	NON MIN	2 OR MORE RACES
Officials/ Managers															
Professionals															
Technicians															
Sales Workers															
Office & Clerical															
Craftworkers (Skilled)															
Operatives (Semi-skilled)															
Laborers (Unskilled)															
Service Workers															
TOTAL															
Total employment From previous Report (if any)															
			The	data belo	w shall NOT	be inclu	ied in the	e figure	es for the	appropr	iate catego	ories abc	ve.		
Temporary & Part- Time Employees															
12. HOW WAS	INFORMA Survey [	TION AS	TO RACE oyment Re	OR ETHN	NIC GROUP	IN SECTIO	N B OBTA	INED?	14. IS T Empl Repo	THIS THE loyee Infor ort Submitt	FIRST mation ed?	15 RI	. IF NO, D EPORT SU MO. 1 DA	ATE LAS BMITTEI Y , YEAR	ST D
13. DATES OF From	PAYROLI :	L PERIOD	USED	To:	:				1. YE	S 🗌 2.	NO				
				SE	CTION C - SI	GNATURE #	ND IDEN	FIFICATI	ON					•	
16. NAME OF P	ERSON CO	OMPLETI	NG FORM	(Print or T	[ype)	SIGN.	ATURE		TI	TLE		D	ATE MO DA	Y YEAF	ł
17. ADDRESS	NO. & ST	REET	CI	ΓY	<u> </u>	COUN	ITY	ST.	ATE Z	TIP CODE	PHONE (A	AREA CO	DE, NO.,E	XTENSIC	DN)

#### INSTRUCTIONS FOR COMPLETING THE EMPLOYEE INFORMATION REPORT (FORM AA302)

**IMPORTANT:** READ THE FOLLOWING INSTRUCTIONS CAREFULLY BEFORE COMPLETING THE FORM. PRINT OR TYPE ALL INFORMATION. FAILURE TO PROPERLY COMPLETE THE ENTIRE FORM <u>AND TO</u> <u>SUBMIT THE REQUIRED \$150.00 NON-REFUNDABLE FEE MAY DELAY ISSUANCE OF YOUR CERTIFICATE</u>. IF YOU HAVE A CURRENT CERTIFICATE OF EMPLOYEE INFORMATION REPORT, DO NOT COMPLETE THIS FORM UNLESS YOUR ARE RENEWING A CERTIFICATE THAT IS DUE FOR EXPIRATION. DO NOT COMPLETE THIS FORM FOR CONSTRUCTION CONTRACT AWARDS.

**ITEM 1** - Enter the Federal Identification Number assigned by the Internal Revenue Service, or if a Federal Employer Identification Number has been applied for, or if your business is such that you have not or will not receive a Federal Employer Identification Number, enter the Social Security Number of the owner or of one partner, in the case of a partnership.

**ITEM 2** - Check the box appropriate to your TYPE OF BUSINESS. If you are engaged in more than one type of business check the predominate one. If you are a manufacturer deriving more than 50% of your receipts from your own retail outlets, check "Retail".

**ITEM 3** - Enter the total "number" of employees in the entire company, including part-time employees. This number shall include all facilities in the entire firm or corporation.

**ITEM 4** - Enter the name by which the company is identified and the company email. If there is more than one company name, enter the predominate one.

**ITEM 5** - Enter the physical location of the company. Include City, County, State and Zip Code.

**ITEM 6** - Enter the name of any parent or affiliated company including the City, County, State and Zip Code. If there is none, so indicate by entering "None" or N/A.

**ITEM 7** - Check the box appropriate to your type of company establishment. "Single-establishment Employer" shall include an employer whose business is conducted at only one physical location. "Multi-establishment Employer" shall include an employer whose business is conducted at more than one location.

**ITEM 8** - If "Multi-establishment" was entered in item 8, enter the number of establishments within the State of New Jersey.

**ITEM 9** - Enter the total number of employees at the establishment being awarded the contract.

**ITEM 10** - Enter the name of the Public Agency awarding the contract. Include City, County, State and Zip Code. This is not applicable if you are renewing a current Certificate.

ITEM 11 - Enter the appropriate figures on all lines and in all columns. THIS SHALL ONLY INCLUDE EMPLOYMENT DATA FROM THE FACILITY THAT IS BEING AWARDED THE CONTRACT. DO NOT list the same employee in more than one job category. DO NOT attach an EEO-1 Report.

#### Racial/Ethnic Groups will be defined:

**Black:** Not of Hispanic origin. Persons having origin in any of the Black racial groups of Africa.

**Hispanic:** Persons of Mexican, Puerto Rican, Cuban, or Central or South American or other Spanish culture or origin, regardless of race.

American Indian or Alaskan Native: Persons having origins in any of the original peoples of North America, and who maintain cultural identification through tribal affiliation or community recognition.

Asian or Pacific Islander: Persons having origin in any of the original peoples of the Far East, Southeast Asia, the Indian Sub-continent or the Pacific Islands. This area includes for example, China, Japan, Korea, the Phillippine Islands and Samoa.

**Non-Minority:** Any Persons not identified in any of the aforementioned Racial/Ethnic Groups.

2 or More Races: Persons identifying as 2 or More Races.

**ITEM 12** - Check the appropriate box. If the race or ethnic group information was not obtained by 1 or 2, specify by what other means this was done in 3.

**ITEM 13** - Enter the dates of the payroll period used to prepare the employment data presented in Item 12.

**ITEM 14** - If this is the first time an Employee Information Report has been submitted for this company, check block "Yes".

**ITEM 15** - If the answer to Item 15 is "No", enter the date when the last Employee Information Report was submitted by this company.

**ITEM 16** - Print or type the name of the person completing the form. Include the signature, title and date.

**ITEM 17** - Enter the physical location where the form is being completed. Include City, State, Zip Code and Phone Number.

#### TYPE OR PRINT IN SHARP BALL POINT PEN

THE VENDOR IS TO COMPLETE THE EMPLOYEE INFORMATION REPORT FORM (AA302) AND RETAIN A COPY FOR THE VENDOR'S OWN FILES. THE VENDOR SHOULD ALSO SUBMIT A COPY TO THE PUBLIC AGENCY AWARDING THE CONTRACT IF THIS IS YOUR FIRST REPORT; AND FORWARD ONE COPY <u>WITH A CHECK IN THE AMOUNT OF \$150.00 PAYABLE TO</u> THE TREASURER, STATE OF NEW JERSEY(FEE IS NON-REFUNDABLE) TO:

NJ Department of the Treasury

Division of Purchase & Property Contract Compliance Audit Unit EEO Monitoring Program P.O. Box 206

Trenton, New Jersey 08625-0206

Telephone No. (609) 292-5473


### FREQUENTLY ASKED QUESTIONS

WEBSITE TO OBTAIN FORMS: www.state.nj.us/treasury/contract\_compliance

WHO SHOULD CHECK OR MONEY ORDER BE PAYABLE TO? The Treasurer, State of New Jersey

**HOW TO OBTAIN A DUPLICATE CERTIFICATE:** Visit the website above and select forms. Print and complete the Duplicate Request Form and mail with a \$75 check or money order payable to The Treasurer, State of NJ, PO Box 206, Trenton, NJ 08625. **NOTE**: No fee is required for name and/or address updates.

HOW LONG DOES IT TAKE TO PROCESS FORM AA-302 AND RECEIVE CERTIFICATE OF EMPLOYEE INFORMATION REPORT? The initial Form AA-302 certificate may take up to three (3) weeks. Renewals certificates may take up to two (2) weeks.

**HOW LONG ARE CERTIFICATES VALID?** For entities with fewer than 50 employees, the certificate is valid for seven (7) years. For entities with 50 employees or more, the certificate is valid for three (3) years.

**WHICH ADDRESS SHOULD BE USED?** When using the United States Postal Service (regular mail) to deliver the Form AA-302 and payment, the following address must be used:

NJ Dept. of the Treasury Contract Compliance and Audit Unit EEO Monitoring Program PO Box 206 Trenton, NJ 08625-0206

When using a commercial delivery service such as FEDEX, UPS or other delivery service, the following address must be used:

NJ Dept. of the Treasury Contract Compliance and Audit Unit EEO Monitoring Program 33 West State Street, 9<sup>th</sup> floor Trenton, NJ 08625

**FOR QUESTIONS RELATED TO CONSTRUCTION FORMS AA-201 AND AA-202:** Contact the NJ Dept. of Labor and Workforce Development, Office of Diversity and Compliance, Construction EEO Monitoring Program at (609) 292-9550.

### HOW TO REGISTER FOR SUBMISSION OF ELECTRONIC RENEWAL CERTIFICATE: Visit

www.state.nj.us/treasury/contract\_compliance. Select the Premier Business Services Online Forms Account Instructions and follow the instructions.

**HOW TO SUBMIT PAYMENT AFTER FILING RENEWAL CERTIFICATE ELECTRONICALLY**? Mail check or money order (in the amount of \$150) to the Division along with a print out of the online submission screen. Make check or money order payable to: The Treasurer, State of New Jersey. Please write your certificate number on the check or money order.

**RECEIVED RENEWAL NOTICE – HOW DO I RENEW MY CERTIFICATE?** Follow the instructions on the renewal notice, refer to the Division's website and select forms, print out the renewal package, complete Form AA-302, Vendor Activity Summary Reports and mail in along with a check or money order payable to: The Treasurer, State of New Jersey.

**TO OBTAIN THE STATUS OF YOUR CERTIFICATE**: Please call (609) 292-5473 and a representative will be available to assist you. Please have your federal ID or certificate number available to ensure faster service. **NOTE**: Renewal Notices will be mailed within 90 days prior to the expiration date of your certificate.

**CAN PAYMENTS BE MADE WITH CREDIT CARDS**? Payments are only accepted in the form of a check or money order in the amount of \$150 and must be submitted with the Form AA-302 (Employee Information Report).

**DO NONPROFIT ORGANIZATIONS HAVE TO COMPLETE FORM AA-302?** Yes, the Employee Information Report (Form AA-302) must be completed by nonprofit organizations to ensure compliance with the EEO requirements.

**WHAT DOES THE CERTIFICATE LOOK LIKE?** The Certificate of Employee Information Report is yellow in color, 3 ½ X 8 ½ and has your assigned certificate number in the top right corner. The entity's name and address along with the effective date and expiration date also are included on the certificate.

THE COMPANY HAS NO EMPLOYEES. SHOULD THE OWNER OPERATING THE BUSINESS REPORT NO EMPLOYEES OR ONE EMPLOYEE FOR HIMSELF/HERSELF? A company with no employees must report the officials and managers on line #3 and also on line #11 (officials/managers).

## SAMPLE CERTIFICATE OF EMPLOYEE INFORMATION REPORT



### INSTRUCTIONS FOR COMPLETING THE INITIAL PROJECT WORKFORCE REPORT – CONSTRUCTION (AA201)

#### DO NOT COMPLETE THIS FORM FOR GOODS AND/OR SERVICE CONTRACTS

1. Enter the Federal Identification Number assigned to the contractor by the Internal Revenue Service, or if a Federal Employer Identification Number has been applied for but not yet issued, or if your business is such that you have not or will not receive a Federal Identification Number, enter the social security number assigned to the single owner or one partner, in the case of a partnership.

2. Note: The Department of Labor & Workforce Development, Construction EEO Monitoring Program will assign a contractor ID number to your company. This number will be your permanently assigned contractor ID number that must be on all correspondence and reports submitted to this office.

- 3. Enter the prime contractor's name, address and zip code number.
- 4. Check box if Company is Minority Owned or Woman Owned
- 5. Enter the complete name and address of the Public Agency awarding the contract. Include the contract number, date of award and dollar amount of the contract.
- 6. Enter the name and address of the project, including the county in which the project is located.
- 7. Note: A project contract ID number will be assigned to your firm upon receipt of the completed Initial Project Workforce Report (AA201) for this contract. This number must be indicated on all correspondence and reports submitted to this office relating to this contract.
- 8. Check "Yes" or "No" to indicate whether a Project Labor Agreement (PLA) was established with the labor organization(s) for this project.
- 9. Under the Projected Total Number of Employees in each trade or craft and at each level of classification, enter the total composite workforce of the prime contractor and all subcontractors projected to work on the project. Under Projected Employees enter total minority and female employees of the prime contractor and all subcontractors projected to work on the project. Minority employees include Black, Hispanic, American Indian and Asian, (J=Journeyworker, AP=Apprentice). Include projected phase-in and completion dates.
- 10. Print or type the name of the company official or authorized Equal Employment Opportunity (EEO) official include signature and title, phone number and date the report is submitted.

This report must be submitted to the Public Agency that awards the contract and the Department of Labor & Workforce Development, Construction EEO Compliance Monitoring Program after notification of award, but prior signing the contract.

## THE CONTRACTOR IS TO RETAIN A COPY AND SUBMIT COPY TO THE PUBLIC AGENCY AWARDING THE CONTRACT AND FORWARD A COPY TO:

NEW JERSEY DEPARTMENT OF LABOR & WORKFORCE DEVELOPMENT CONSTRUCTION EEO COMPLIANCE MONITORING UNIT P.O. BOX 209 TRENTON, NJ 08625-0209 (609) 292-9550

**Official Use Only** 

## STATE OF NEW JERSEY

DEPARTMENT OF LABOR & WORKFORCE DEVELOPMENT CONSTRUCTION EEO COMPLIANCE MONITORING PROGRAM Assignment

Code

FORM AA-201 Revised 11/11

#### **INITIAL PROJECT WORKFORCE REPORT CONSTRUCTION**

For instructions on completing the form, go to: http://www.state.nj.us/treasury/contract\_compliance/pdf/aa201ins.pdf

			BED						CONTRACT		
					5. NAME AND ADDRESS OF PUBLIC AGENCY AWARDING CONTRACT						
3. NAME AND ADDRESS OF PRIME CONT	 FRACTOR				Address						
					, laare						
(Name)					CONTRACT NUMBER DATE OF AWARD DOLLAR AMOUNT OF AWARD						
(Street Address)						6. NAME AND ADDRESS OF PROJECT 7. PROJECT NUMBER Name: Address:					
(City) (State) (Zip Cod	e)								8. IS THIS PROJEC	T COVERED BY A PROJEC	
4. IS THIS COMPANY MINORITY OWNED	[] OR WO	OMAN O	WNED	[]	COUNT	Y			LABOR AGREEMEN	IT (PLA)? YES 🔞	
9. TRADE OR CRAFT	PROJECT	TED TOTAL	EMPLOYE	ES	PROJECT	ED MINORI	TY EMPLOY	EES	PROJECTED	PROJECTED	
	MALE		FEMALE		MALE		FEMALE		PHASE - IN	COMPLETION	
	_	AP	J	AP	J	AP	J	AP	DATE	DATE	
1. ASBESTOS WORKER	_										
2. BRICKLAYER OR MASON	_										
3. CARPENTER											
4. ELECTRICIAN											
5. GLAZIER											
6. HVAC MECHANIC											
7. IRONWORKER											
8. OPERATING ENGINEER											
9. PAINTER											
10. PLUMBER											
11. ROOFER											
12. SHEET METAL WORKER											
13. SPRINKLER FITTER											
14. STEAMFITTER											
15. SURVEYOR											
16. TILER											
17. TRUCK DRIVER											
18. LABORER											
19. OTHER											
20. OTHER											

Thereby certify that the foregoing statements made by me are true. I am aware that if any of the foregoing statements are willfully

false, I am subject to punishment.

(Signature)

10. (Please Print Your Name)

(Title)

FORM AA-202 REVISED 11/11

## State Of New Jersey

Department of Labor & Workforce Development Construction EEO Compliance Monitoring Program

#### **MONTHLY PROJECT WORKFORCE REPORT - CONSTRUCTION**

For instructions on completing the form, go to: http://www.state.nj.us/treasury/contract_compliance/pdf/aa202ins.pdf							3. F ID a	or SS Num	nber											
1.Name and address of Prime Co	ontractor				2. Cont	ontractor ID Number 4. Reporting Period														
(NAME)						5. Public Agency Awarding Contract						Date of Award								
(ADDRESS)								6. Name and Location of Project County					7. Project ID Number							
(CITY)			(STATE)		(ZIP CODE)															
			CLASSI-		11. NUM	BER OF EMPL	OYEES	_		12. TOTAL	13. WOR	K HOURS	6	14. % OF WC	ORK HRS	15. CUM.	WORK HRS	-	16. CUM. %	OF W/H
8. CONTRACTOR NAME	9. PERCENT	10. TRADE	FICATION	A.	B.	C.	D.	E.	F.	NO. OF	TOTAL	A.	B.	A.	B.	TOTAL	A.	B.	A.	B.
WITH SUBS FOLLOWING)	COMPLETED	CRAFT	(SEE REVERSE)	TOTAL	DEAGN	HISPANIC	INDIAN	ASIAN	FEMALES	EMP.	HOURS	W/H	W/H	W/H	W/H	HOURS	HOURS	HOURS	W/H	W/H
			J																	
			АР																	
			J																	
			AP																	
			J																	
			AP																	
			J																	
			J																	
			AP																	
17. COMPLETED BY (PRINT OR TYP	PE)																			

(NAME)

(TELEPHONE NUMBER)

(TITLE)

(SIGNATURE)

(EXT.)

#### PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS,	, that we, the undersigned
as PRINCIPAL and sureties with underwriting of	office at
to which all communication in regard to this bo	ond should be addressed, a Corporation organized
and existing under the laws of the State of	and duly authorized to do business in the
state of New Jersey, as SURETY, are hereby held	ld and firmly bound unto the
	(Owner) in the penal sum of
	Dollars, (\$)
for payment of which well and truly to be mad our heirs, executors, administrators, successors,	ide, we hereby jointly and severally bind ourselves, s, and assigns.
SIGNED and SEALED thisC	day oftwo thousand and
THE CONDITION OF THE ABOVE OBL named Principal did on the day of	LIGATION IS SUCH THAT, WHEREAS, the above , 20, entered into a contract with identified as
	which said contract,
upon execution by the Owner, and the Principa herein.	al, will be a part of this bond the same as though set forth

Now, if the said Principal shall well and faithfully do and perform each and every, all and singular, the things agreed by it (or them) to be done and performed according to the terms of said contract, and shall pay all lawful claims of beneficiaries as defined by N.J.S.2A:44-143 for labor performed or materials, provisions, provender or other supplies or teams, fuels, oils, implements or machinery furnished, used or consumed in the carrying forward, performing or completing of said contract, we agreeing and assenting that this undertaking shall be for the benefit of any beneficiary as defined in N.J.S.2A:44-143 having a just claim, as well as for the oblige herein; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The said Surety hereby stipulated and agrees that no modifications, omissions or additions in or to the terms of the said contract, or in or to the plans or specifications therefore, shall in anyway affect the obligations of said Surety on its bond.

Recovery of any claimant under the bond shall be subject to the conditions and provisions of this article to the same extent as if such conditions and provisions were fully incorporated in the form set forth above.

	Principal:	Affix
Witness	By: Print Name:	Corporate Seal
Print or Type Name	Print Title:	
	Surety:	Affix
	By:	Seal
Witness	Print Name: Print Title:	
Print or Type Name		

#### **PAYMENT BOND**

Bond No.

KNOW ALL MEN BY THESE PRES as PRINCIPAL and sureties with underwriting	ENTS, that we, the undersigned
to which all communication in regard to this b	ond should be addressed, a Corporation organized and
existing under the laws of the State of	and duly authorized to do business in the state of
New Jersey, as SURETY, are hereby held and	firmly bound unto the
in the penal sum of	, for payment of which well and truly to
be made, we hereby jointly and severally bin and assigns.	d ourselves, our heirs, executors, administrators, successors,
SIGNED and SEALED thisda	ay oftwo thousand and

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH THAT, WHEREAS, the above named Principal did on the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, entered into a contract with

identified as \_\_\_\_

which said contract, upon execution by the Owner, and the Principal, will be a part of this bond the same as though set forth herein.

Now, if the said Principal shall pay all lawful claims of beneficiaries as defined by N.J.S.2A:44-143 for labor performed or materials, provisions, provender or other supplies or teams, fuels, oils, implement or machinery furnished, used or consumed in carrying forward, performing or completing of said contract, we agreeing and assenting that this undertaking shall be for the benefit of any beneficiary as defined in N.J.S.2A;44-143 having a just claim, as well as for the party of the first part mentioned in the contract aforesaid; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The said Surety hereby stipulated and agrees that no modifications, omissions or additions in or to the terms of the said contract, or in or to the plans or specifications therefore, shall in anyway affect the obligations of said Surety on its bond.

	<b>Principal</b> :	Affix Corporate
	By:	Seal
Witness	Print Name: Print Title:	
Print or Type Name		
	Surety:	Affix Corporate
	By:	Seal
Witness	Print Name: Print Title:	

Print or Type Name

### MAINTENANCE BOND

KNOW ALL MEN BY THESE PRESENTS, That we, the undersigned,

as principal, and	a Corporation organized ar	nd existing under the
laws of the state of	, and duly authorized to	do business in the
State of New Jersey, as Surety, are held and t	îrmly bound unto the	
as Owner, in the penal sum of		
(10% of the	Final Contract Amount)	
for payment of which, well and truly to be ma heirs, executors, administrators, successors a	de, we hereby, jointly, and severall nd assigns.	ly, bind ourselves, our
THE CONDITION OF	THE ABOVE OBLIGATION IS SU	ICH, That whereas
the above named principal did on the	day of	, 20,
enter into a Contract with the Owner for		
(P	roject Name)	

which said Contract is made a part of this bond the same as though set forth herein.

NOW, if the said principal shall remedy without cost to the Owner any defects which may develop during the one (1) year Maintenance Period of the work performed under the said Contract, provided such defects, in the judgment of the Owner are caused by defective or inferior materials or workmanship, then this obligation shall be void, otherwise it shall be and remain in full force and effect. The one (1) year period shall commence on the date established in the Certificate of Substantial Completion.

The said Surety hereby stipulates and agrees that no modifications, deletions or additions in or to the terms of the said Contract or the plans or specifications therefor shall in any way affect its obligations on this bond.

Signed and Sealed this	day of	, 20
	()	(
	(Principal)	(Seal)
(Witness)		
	(mue)	
	(Surety)	(Seal)
(Witness)		
	(Title)	

MAINTENANCE BOND

### **Surety Disclosure Statement and Certification**

N.J.S. A. 2A:44-143

## SAMPLE

#### SURETY DISCLOSURE STATEMENT AND CERTIFICATION

....., surety(ies) on the attached bond, hereby certifies(y) the following:

(1) The surety meets the applicable capital and surplus requirements of N.J.S.A.17:17-6 or N.J.S.A. 17:17-7 as of the surety's most current annual filing with the New Jersey Department of Insurance.

(2) The capital (where applicable) and surplus, as determined in accordance with the applicable laws of this State, of the surety(ies) participating in the issuance of the attached bond is (are) in the following amount(s) as of the calendar year ended December 31, ...... (most recent calendar year for which capital and surplus amounts are available), which amounts have been certified as indicated by certified public accountants (indicating separately for each surety that surety's capital and surplus amounts, together with the name and address of the firm of certified public accounts that shall have certified those amounts):

------

(3) (a) With respect to each surety participating in the issuance of the attached bond that has received from the United States Secretary of the Treasury a certificate of authority pursuant to 31 U.S.C. 9305, the underwriting limitation established therein and the date as of which that limitation was effective is as follows (indicating for each such surety that surety's underwriting limitation and the effective date thereof):

.....

.....

(b) With respect to each surety participating in the issuance of the attached bond that has not received such a certificate of authority from the United States Secretary of the Treasury, the underwriting limitation of that surety as established pursuant to N.J.S.A. 17:18-9 as of (date on which such limitation was so established) is as follows (indicating for each such surety that surety's underwriting limitation and the date on which that limitation was established):

.....

.....

.....

(4) The amount of the bond to which this statement and certification is attached is \$.....

(5) If, by virtue of one or more contracts of reinsurance, the amount of the bond indicated under item (4) above exceeds the total underwriting limitation of all sureties on the bond as set forth in items (3)(a) or (3)(b) above, or both, then for each such contract of reinsurance:

(a) The name and address of each such reinsurer under that contract and the amount of that reinsurer's participation in the contract is asfollows:.....

.....

.....

.....; and

(b) Each surety that is party to any such contract of reinsurance certifies that each reinsurer listed under item (5)(a) satisfies the credit for reinsurance requirement established under NJSA 17:51B-1 et seq. and any applicable regulations in effect as of the date on which the bond to which this statement and certification is attached shall have been filed with the appropriate public agency.

CERTIFICATE

(to be completed by an authorized certifying agent

for each surety on the bond)

I ...... (name of agent), as ....... (title of agent) for ....... (name of surety), a corporation/mutual insurance company/other (indicating type of business organization) (circle one) domiciled in ...... (state of domicile), DO HEREBY CERTIFY that, to the best of my knowledge, the foregoing statements made by me are true, and ACKNOWLEDGE that, if any of those statements are false, this bond is VOIDABLE.

.....

(Signature of certifying agent)

.....

(Printed name of certifying agent)

.....

(Title of certifying agent)

# ${}^{\mbox{\tiny \ensuremath{\$}}} AIA^{\mbox{\tiny \ensuremath{\$}}}$ Document A101<sup> $\mbox{\tiny \ensuremath{\$}}$ - 2017</sup>

## 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)

Egg Harbor Township School District Board of Education 13 Swift Drive Egg Harbor, NJ 08234

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)

Fraytak Veisz Hopkins Duthie, P.C. 1515 Lower Ferry Road Trenton, NJ 08618

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. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

The parties should complete A101<sup>™</sup>–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201<sup>™</sup>–2017. 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
- THE WORK OF THIS CONTRACT 2
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- CONTRACT SUM 4
- PAYMENTS 5
- **DISPUTE RESOLUTION** 6
- **TERMINATION OR SUSPENSION** 7
- 8 MISCELLANEOUS PROVISIONS
- 9 **ENUMERATION OF CONTRACT DOCUMENTS**

EXHIBIT A INSURANCE AND BONDS

#### **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: (Check one of the following boxes.)

- The date of this Agreement. [ ]
- [X] A date set forth in a notice to proceed issued by the Owner/Architect.
- Established as follows: [ ] (Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

(Paragraph deleted)

§

#### § 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

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[ ] Not later than () calendar days from the date of commencement of the Work.

[X] By the following date: as shown in specification section 01800

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Com	pletion	Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

#### **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 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

ltem	Price							
<b>§ 4.2.2</b> Subject to the condition execution of this Agreement. U ( <i>Insert below each alternate a</i> )	is noted below, the following alternates may be accept Jpon acceptance, the Owner shall issue a Modification and the conditions that must be met for the Owner to a	oted by the Owner following on to this Agreement. accept the alternate.)						
ltem	Price	Conditions for Acceptance						
§ 4.3 Allowances, if any, inclue (Identify each allowance.)	ded in the Contract Sum:							
ltem	Price							
§ 4.4 Unit prices, if any: (Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)								
ltem	Units and Limitations	Price per Unit (\$0.00)						
<b>§ 4.5</b> Liquidated damages, if an (Insert terms and conditions fo	ny: or liquidated damages, if any.)							

Liquidated damages to be assessed in accordance with Specification Section 01800 - Time of Completion and liquidated Damages.

#### § 4.6 Other:

(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

Init. 1

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#### **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 fifteenth day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the fifteenth day of the following month..

(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 of values 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 In accordance with AIA Document A201<sup>TM</sup>\_2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- That portion of the Contract Sum properly allocable to completed Work; .1
- .2 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; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- The aggregate of any amounts previously paid by the Owner; .1
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201-2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- For Work performed or defects discovered since the last payment application, any amount for which .4 the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201-2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

#### § 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

2% of the amount due on each partial payment shall be withheld by the board of education when the outstanding balance of the contract exceeds \$500,000, and 5% of the amount due on each partial payment shall be withheld when the outstanding balance of the contract is \$500,000 or less.

Init. 1

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§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

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

(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

5% of the amount due on each partial payment shall be withheld when the outstanding balance of the contract is \$500,000 or less.

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage upon Substantial Completion.)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201-2017.

§ 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

- the Contractor has fully performed the Contract except for the Contractor's responsibility to correct .1 Work as provided in Article 12 of AIA Document A201–2017, 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:

#### § 5.3 Interest

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.)

%

#### **ARTICLE 6 DISPUTE RESOLUTION**

The Owner and Contractor shall endeavor to resolve claims, disputes, and other matters in question between them by mediation. The Mediator shall be appointed jointly by the parties and the fees of the Mediator shall be evenly split between the parties. If the parties are unable to reach agreement on the selection of a Mediator, the parties shall then make joint application to the Assignment Judge of the county where the Owner's principal place of business is for the appointment of a Mediator by court.

(Paragraphs deleted)

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#### **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 A201-2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows: (Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

#### ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

(Name, address, email address, and other information)

(Name, address, email address, and other information)

#### (Paragraphs deleted)

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101<sup>TM</sup>–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101<sup>TM</sup>-2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203<sup>TM</sup>-2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

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(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

1

8.7.1 A condition of this Agreement is that the Contractor will comply with all applicable governmental laws and regulations including, but without limitation, those set forth in Section 00860 of the Specifications, which are hereby incorporated by reference as if set forth herein at length.

#### **ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS**

§ 9.1 This Agreement is comprised of the following documents:

AIA Document A101<sup>™</sup>–2017, Standard Form of Agreement Between Owner and Contractor .1

.2 AIA Document A101<sup>TM</sup>–2017, Exhibit A, Insurance and Bonds

.3 AIA Document A201<sup>TM</sup>–2017, General Conditions of the Contract for Construction (Paragraphs deleted)

.5	Dı	rawing	ξS			
	Nı	ımber		Title	Date	
.6	Sp	ecific	ations			
	Se	ection		Title	Date	Pages
.7	A	ldend	a, if any:			
	Νι	ımber		Date	Pages	
.8	Pc Do Ot (C re: [	ortions ocume ther E: <i>Theck of</i> <i>quired</i>	of Addenda relating to biddin ints unless the bidding or prop- khibits: <i>all boxes that apply and inclua</i> <i>!.)</i> AIA Document E204 <sup>™</sup> –2017 (Insert the date of the E204-2	g or proposal requirements a osal requirements are also er <i>le appropriate information id</i> 7, Sustainable Projects Exhil 017 incorporated into this A	are not part of the numerated in this <i>A</i> <i>dentifying the exhi</i> pit, dated as indica <i>lgreement.</i> )	Contract Article 9. <i>ibit where</i> ated below:
	[	]	The Sustainability Plan:			
		Title		Date	Pages	
	[	]	Supplementary and other Con	nditions of the Contract:		
		Docu	ment	Title	Date	Pages

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.9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201<sup>TM</sup>\_2017 provides that the advertisement or invitation to bid. Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

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

**OWNER** (Signature)

**CONTRACTOR** (Signature)

(Printed name and title)

(Printed name and title)

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## Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the day of in the year (In words, indicate day, month and year.)

for the following **PROJECT**: (Name and location or address)

THE OWNER: (Name, legal status and address)

THE CONTRACTOR: (Name, legal status and address)

#### TABLE OF ARTICLES

- A.1 GENERAL
- A.2 **OWNER'S INSURANCE**
- A.3 CONTRACTOR'S INSURANCE AND BONDS
- A.4 SPECIAL TERMS AND CONDITIONS

#### GENERAL ARTICLE A.1

The Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201<sup>TM</sup>–2017, General Conditions of the Contract for Construction and the Project Manual.

#### **ARTICLE A.3** CONTRACTOR'S INSURANCE AND BONDS

#### § A.3.1 General

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§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability

#### ADDITIONS AND DELETIONS:

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

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

This document is intended to be used in conjunction with AIA Document A201@2017, General Conditions of the Contract for Construction. Article 11 of A201®-2017 contains additional insurance provisions.

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coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner and such other parties as the Owner may designate as an additional insured, pursuant to A.3.1.3, on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies. The coverage maintained by the Contractor shall be written by companies licensed to do business in the State where the project is located and maintaining an AM BEST rating of A- or better with a financial size rating of Class IX or larger.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose, in accordance with A.3.1.1, to the Owner any deductible or self- insured retentions applicable to any insurance required to be provided by the Contractor. Such deductibles or self-insured retentions shall be subject to the Owner's reasonable approval. The Contractor shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor (and all Subcontractors) shall cause the commercial general liability coverage 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 for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided under Article A.3.2 Contractor's Required Insurance Coverage. The Products and Completed Operations insurance shall be maintained for five (5) years after final payment or the then current applicable statute of repose. A "per project endorsement" shall be included, so that the general aggregate limit applies solely to the Project that is the subject of this contract.

§ A.3.1.5 Contractor shall, without in any way altering Contractor's liability under the Contract or applicable law, obtain, pay for and maintain insurance for the coverages and amounts of coverage not less than those set forth below in the Schedule of Insurance Coverages and shall provide to Owner certificates issued by insurance companies satisfactory to Owner to evidence such coverage no later than 7 days from the date of the execution of this Contract and prior to any personnel or equipment being brought onto and/or before any work commences at the job site. The coverage afforded under any insurance obtained pursuant to this paragraph shall be primary to any valid and collectible insurance carried separately by any of the indemnities. Such certificates shall provide that there shall be no cancellation, non-renewal or material change of such coverage without thirty (30) days prior written notice to Owner. In the event of any failure by Contractor to comply with the provisions of this Article 3, Owner may, at its option, on notice to Contractor, suspend the Contract for cause until there is full compliance with this Article 3 and/ or terminate the Contract for cause. Alternatively, Owner may purchase such insurance at Contractor's expense, provided that Owner shall have no obligation to do so, and if Owner shall do so, Contractor shall not be relieved of or excused from the obligation to obtain and maintain such insurance amounts and coverages. Contractor shall provide to Owner a copy of any and all applicable insurance policies. The Owner shall be named as an additional insured on a primary and non-contributory basis on all Insurance Policies to be provided by the Contractor

#### § A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions. The Contractor shall either require each of his subcontractors to procure and to maintain during the life of their subcontracts, subcontractor's public liability and property damage, of the type and in the same amounts as specified below; or insure the activities of their subcontractors under their respective policies.

#### § A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than four million dollars (\$ 4,000,000.00 ) each occurrence, four million dollars (\$ 4,000,000.00 ) general aggregate, and four million dollars (\$ 4,000,000.00 ) aggregate for products-completed operations hazard and independent contractor liability), providing coverage for claims including

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- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person:
- .2 personal injury and advertising injury;
- damages because of physical damage to or destruction of tangible property, including the loss of use of .3 such property:
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.
- .6 the policy shall name the Owner, Architect, Construction Manager (if applicable) and their Consultants, Agents and Employees as additional insured.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

- Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact .1 that the claimant is an insured, and there would otherwise be coverage for the claim.
- .2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- .3 Claims for bodily injury other than to employees of the insured.
- Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees .4 of the insured.
- .5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- .6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- .7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- .8 Claims related to roofing, if the Work involves roofing.
- Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings .9 or surfaces, if the Work involves such coatings or surfaces.
- .10 Claims related to earth subsidence or movement, where the Work involves such hazards.
- .11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than one million dollars (\$ 1,000,000.00 ) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits applicable to the laws of the State and other State or Federal jurisdiction required to protect the employees of the Contractor and any Subcontractor who will be engaged in the performance of this Contract. The certificate must also indicate that no proprietor, partner, executive officer or member is excluded. This insurance shall include Employers' Liability Protection.

§ A.3.2.6 Employers' Liability with policy limits not less than one million dollars (\$1,000,000) bodily injury, each occurrence, one million dollars (\$1,000,000) disease, each employer, and one million dollars (\$1,000,000) disease, aggregate limit. Including the employer's liability insurance under the umbrella insurance can satisfy the limit requirements.

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§ A.3.2.13 Excess Liability, umbrella insurance form, applying excess of primary to the commercial general liability, commercial automobile liability and employer's liability insurance shall be provided with minimum limits in an amount such that the commercial general liability insurance and excess/umbrella is equal to \$4,000,000 per occurrence, general aggregate, and products/completed operations.

§ A.3.2.14 The General Liability insurance, General Aggregate and Umbrella Excess Liability limits shall apply and be written exclusively, in total, to this Project only. A per project endorsement for all coverages and limits must be included in each policy.

A.3.2.14.1 Bodily injury and property damage insurance policies shall be so written as to provide coverage for special hazards where such hazards will be incidental to subcontractors' work.

#### § A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

- § A.3.3.2.1 Property insurance of the same type and scope satisfying the requirements identified in [ ] Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below: (Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)
- § A.3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the 1 construction site on an "all-risks" completed value form.
- [] § A.3.3.2.5 Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

#### [] § A.3.3.2.6 Other Insurance

(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage

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#### § A.3.4 Performance Bond and Payment Bond

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The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows: (Specify type and penal sum of bonds.)

Type Penal Sum (\$0.00) Payment Bond Amount equal to the Contract Sum Performance Bond Amount equal to the Contract Sum

Payment and Performance Bonds shall be in a form acceptable to the Owner.

§ A.3.4.1 Contractor shall furnish each of the performance bond and payment bond meeting all statutory requirements of the State of New Jersey in form and substance satisfactory to the Owner and, without limitation, complying with the following specific requirements:

- Except as otherwise required by statute, the form and substance of such bonds shall be satisfactory to the Owner in the Owner's sole judgment;
- .2 The bonds shall be executed by an approved surety company authorized to do business in the State of New Jersey and in accordance with N.J.S.A. 2A:44-143 and 2A:44-144, and with the three highest rating categories of rating companies nationally recognized and listed as per Appendix A, (go to www.nj.gov/dobi/surety.htm), and shall remain in effect for a period of not less than one year following the date of substantial completion or the time required to resolve any items of incomplete or inadequate work and the payment of any disputed amounts, whichever time period is longer;
- .3 The performance bond and the labor and material payment bond shall each be in an amount equal to the Contract Sum:
- .4 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of his/her power of attorney indicating the monetary limit of such power;
  - Any bond under this Paragraph must display the surety's bond number. A rider including the following provisions shall be attached to each bond:
    - Surety hereby agrees that it consents to and waives notice of any addition, alteration, omission, change or other modification of the Contract Documents. Any other alterations, change, extension of time or other modification of the Contract Documents or a forbearance on the part of either the Owner or the Contractor to the other shall not release the surety of its obligations hereunder and notice to surety of such matter is hereby waived.
      - Surety further agrees that in the event of any default by the Owner in the performance of the Owner's obligations to the Contractor under the Contract, the Contractor or surety shall cause written notice of such default (specifying said default in writing) to be given to the Owner, and the Owner shall have thirty (30) calendar days after receipt of such notice within which to cure such default or such additional reasonable time as may be required if the nature of such default is such that it cannot be cured within thirty (30) calendar days. Such notice of default shall be sent by certified or registered U.S. mail, return receipt requested, first class postage, prepaid to the Owner.

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PART 1 - CONTRACT CONDITIONS AND GENERAL REQUIREMENTS

SECTION 00700 - GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION AIA DOCUMENT A201 – 2017

# **AIA** Document A201° – 2017

## General Conditions of the Contract for Construction

for the following PROJECT: (Name and location or address)

#### THE OWNER:

Egg Harbor Township School District Board of Education

13 Swift Drive, Egg Harbor, NJ 08234

#### THE ARCHITECT:

Fraytak Veisz Hopkins Duthie, P.C. Architects - Planners

1515 Lower Ferry Road, Trenton, NJ 08618

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For guidance in modifying this document to include supplementary conditions, see AIA Document A503<sup>™</sup>, Guide for Supplementary Conditions.

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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. The Contract Documents shall include the Bidding Requirements, including, but not limited to Advertisement or Invitation to Bid, Instructions to Bidders, the Contractor's Bid Proposal Form and other bidding forms, or portions of the Addenda relating to any Bidding Documents. The Contract Documents shall apply to all Prime Contractors for the Project and each Prime Contractor is responsible for the content of all.

## § 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.

§ 1.1.2.1 The Contractor acknowledges and warrants that it has closely examined all of the Contract Documents, that they are suitable and sufficient to enable the Contractor to complete the Work in a timely manner for the Contract Sum, and that they include all Work, whether or not shown or described, which reasonably may be inferred to be required or useful for the completion of the Work in full compliance with all applicable codes, laws, ordinances and regulations.

## § 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.

§ 1.1.3.1 The Contractor is strongly encouraged to visit the site of the Project before submitting a bid. Such site visit shall be for the purpose of familiarizing the Contractor with the conditions as they exist and the character of the operations to be carried on under the Contract Documents, including all existing site conditions, access to the site, physical characteristics of the site and surrounding areas.

§ 1.1.3.2 Nothing in these General Conditions shall be interpreted as imposing on either the Owner or Architect, or their respective agents, employees, officers, directors or consultants, any duty, obligation or authority with respect to any items that are not intended to be incorporated into the completed project, including but not limited to shoring, scaffolding, hoists, temporary weatherproofing, or any temporary facility or temporary activity, since these are the sole responsibility of the Contractor.

## § 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.

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§ 1.1.5.1 The Drawings are diagrammatical and show the general arrangement and extent of the Work; exact locations and arrangements of parts shall be determined as the Work progresses and shall be subject to the Architect's approval.

- .1 No extra compensation will be allowed due to discrepancies between actual dimensions and those indicated.
- .2 The right is reserved by the Architect to make any reasonable change in location of equipment, ductwork, and piping prior to roughing in without involving additional expense to the Owner.
- Contractor shall coordinate his/her Work within the Work of others, so that interference between .3 mechanical, electrical and other work and the architectural and structural work does not occur.
- .4 Contractor shall furnish and install supports, hangers, offsets, bends, turns, and the like in connection with this Work to avoid interference with work of other Contractors, to conceal Work where required, and to secure necessary clearance and access for operation and maintenance without involving additional expense to the Owner.

# § 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. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

### § 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.

§ 1.2.1.1 The general character of the detail work is shown on the drawings, but minor modifications may be made in large scale details. Where the word "similar" occurs on the drawings, it shall be used in its general sense and not as meaning identical, and all details shall be worked out in relation to their location and their connection to other parts of the work.

- Where on any drawings a portion of the work is drawn out and the remainder is indicated in outline, the .1 parts drawn out shall apply also to other like portions of the work.
- Where detail is indicated by starting only, such detail shall be continued throughout the courses or parts in .2 which it occurs and shall also apply to all other similar parts in the work unless otherwise indicated.
- .3 In case of differences between small and large-scale drawings, the larger scale drawings shall take precedence. Dimensions given shall take precedence over scale measurements.

§ 1.2.1.2 During the course of the work, should any ambiguities or discrepancies be found in the Specifications or on the Drawings; or should there be found any discrepancies between the Drawings and Specifications to which the Contractor has failed to call attention before submitting his/her bid, then the Architect will interpret the intent of the Drawings and Specifications; and the Contractor hereby agrees to abide by the Architect's interpretation and to carry out the work in accordance with the decision of the Architect.

§ 1.2.1.3 It is expressly stipulated that neither the Drawings nor the Specifications shall take precedence over the other, and it is further stipulated that the Architect may interpret or construe the Drawings and Specifications so as to secure in all cases the result most consistent with the needs and requirements of the work. In the event of such

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ambiguity or discrepancy, the Contractor shall comply with the more stringent requirement, and supply the better quality or greater quantity of work.

§ 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.

§ 1.2.2.1 The various materials and products specified in the Specifications by name or description are given to establish a standard of quality and of cost for bid purposes. It is not the intent to limit the acceptance to any one material or product specified, but rather to name or describe it as the absolute minimum standard that is desired and acceptable.

- .1 A material or product of lesser quality will not be acceptable.
- .2 Where "Basis of Design" products or manufacturer's names are used, whether or not followed by the words "Or Approved Equal", they shall be subject to approved equals and authorized only by the Architect and/or the Owner.

§ 1.2.2.2 Substitutions lowering performance, quality, method of assembly or installation, or in general not in keeping with details and specifications, will not be permitted. Refer to substitution procedure indicated elsewhere in the Contract Documents.

§ 1.2.2.3 It is understood when a bid for any product or material is submitted, the bidder is aware of specified requirements and all materials or products within his/her bid are equal or better than such specified items.

§ 1.2.2.4 In addition to the Specifications, it shall be understood that details on Drawings shall become part of the Specification in determining the required "Standard of Quality".

§ 1.2.2.5 If a conflict occurs between the Drawing details and Specifications, the bidder during the bidding process and/or Contractor shall bring such conflicts to the attention of the Architect in accordance with applicable requirements indicated elsewhere in other sections of the Contract Documents.

§ 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 retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Subsubcontractors, and 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 the 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 suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, 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 suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

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# § 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

## § 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203<sup>™</sup>–2013, Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

# § 1.8 Digital Data Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203<sup>TM</sup>-2013, Building Information Modeling and Digital Data Exhibit, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

## **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 Evidence of the Owner's Financial Arrangements **Refer to Section 00800 – Supplementary General Conditions**

## (Paragraphs Deleted)

§ 2.3 Information and Services Required of the Owner §

§ 2.3.2 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.

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

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(Paragraphs Deleted)

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# § 2.4 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.

# § 2.5 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 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 default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for 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. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor may file a Claim pursuant to Article 15.

# **ARTICLE 3 CONTRACTOR**

## § 3.1 General

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§ 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 its 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.

- .1 If the Contractor requires clarification of the intent of the Contract Documents after award, the Contractor shall be responsible to issue a type written Request for Information (RFI) to the Architect utilizing the Architect's sample form via acceptable methods set forth in Section 4.2.4.
- .2 All RFI's shall clearly identify the Architect's project number, the Construction Company name, author's name, date issued, address, phone number(s), facsimile number and the addressee of the communication.
- .3 RFI's shall be sequentially identified and numbered when issued to the Architect with the following prefix for each trade and shall be logged accordingly:

S – Structural Work (ex. S1, S2, etc.)

- P/FP Plumbing / Fire Protection Work
- H Heating, Ventilating, Air Conditioning, Refrigeration Work (HVACR)
- E Electrical / Information Technology Work
- G General Construction Work
- .4 RFI's involving Structural, Plumbing / Fire Protection, HVACR or Electrical Work shall be addressed and issued to the Architect and simultaneously issued directly to the respective Consulting Engineer.

**§ 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 2.3.4, 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.

### § 3.2.2.1 Conditions Precedent – Notice

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- .1 Notice of any alleged Conflict that have been reasonably identified prior to submitting a Bid shall be provided to the Architect immediately in order that the Architect in its discretion, may issue an Addendum.
- .2 A Bidder's failure to do so constitutes an absolute waiver of any Conflict that may thereafter be asserted with respect thereto and shall bar any recovery regard such Conflict.
- If any errors, inconsistencies or omissions appear in the drawings, specifications or other Contract .3 Documents, which should reasonably have been discovered and concerning which interpretation had not been obtained from the Architect during the Bidding Period, the Contractor shall within ten (10) days after written "Notice of Award", notify the Architect in writing of such error, inconsistency or omission. In the event the Contractor fails to give such notice, the Contractor and its Surety will indemnify the Owner for the costs of any such errors, inconsistencies or omissions and the cost of rectifying same including attorney's fees. Interpretation of this procedure after the ten-day period will be made by the Architect and his/her decision will be final. By Submission of a Bid, the Contractor acknowledges that the Contract Documents are full and complete, are sufficient to have enabled it to determine the cost of the Work and that the Drawings, the Specifications and all Addenda are sufficient to enable the Contractor to construct the Work outlined therein in accordance with applicable laws, statutes, ordinances, building codes and regulations, and otherwise to fulfill all of its obligations under the Contract Documents.
- Contractor acknowledges, except as to any reported error, inconsistencies or omissions, and to concealed or .4 unknown conditions defined in elsewhere, by executing the Agreement, the Contractor represents the following:
  - .1 The Contract Documents are sufficiently complete and detailed for the Contractor to perform the Work and comply with all requirements of the Contract Documents.
  - .2 The Work required by the Contract Documents, including, without limitation, all construction details, construction means, methods, procedures, and techniques necessary to perform the Work, use of materials, selection of equipment, and requirements of products by manufacturers are consistent with:
    - .1 good and sound practices within the construction industry;
    - .2 generally prevailing and accepted industry standards applicable to Work;
    - .3 requirements of any warranties applicable to the Work; and
    - all laws, ordinances, regulations, rules, and orders which bear upon the Contractor's .4 performance of the Work.
  - The Contractor has read, understands and accepts the Contract Documents and its Bid was made in .3 accordance with them.
  - The Contract Sum is based upon the products, materials, systems and equipment required by the Contract Documents without exception. Where the Contract Documents list one or more manufacturer or brand name products, materials, systems and equipment as acceptable, the Contract Sum is, in each instance, based upon one of the listed manufacturers or brand name products, materials, systems and equipment, or, if the Contract Sum is based upon the substitution of an "or equal" manufacturer or product, material, system or equipment, the Contractor has in each such instance sought and received the Architect's approval for the substitution either:
    - .1 prior to the Bid in accordance with the Architect's Addenda;
    - .2 after commencement of the Work, under in conformance with substitution procedures elsewhere in the Contract Documents.
  - The Contract Sum is firm and is all inclusive and no escalation is contemplated for any reason .5 whatsoever.
    - .1 The Contract Sum includes any and all costs associated with completion by those dates and times, including any and all costs associated with out-of-sequence work, come-back work, stand-by work, stacking of Trades, coordination with the schedules and work of separate Contractors, allowing sufficient time, work and storage areas, and site access for
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separate Contractors to timely progress and complete their work, overtime, expediting and acceleration that may be required to complete the work by those dates and times.

- .2 The Contractor has reviewed the completion dates and times, and Milestone dates set forth in the Contract Documents, agrees that such dates and times are reasonable and commits to achieve them.
- The Contractor shall satisfy itself as to the accuracy of all dimensions and locations. In all cases of .6 interconnection of its work with existing or other work, it shall verify at the site, all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to verify all such locations or dimensions shall be promptly rectified by the Contractor without any additional cost to the Owner.

§ 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 submit 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 and/or his/her Surety shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

### § 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be 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 notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

- .1 At any time within the construction period, the Owner or Architect shall have the right to require the replacement of the Prime Contractor's Project Manager, Superintendent, or Foreman.
- .2 The Owner or Architect shall have the authority to direct the Contractor to assign additional supervisory personnel to ensure compliance with the Contract schedule and qualify requirements at no addition to the Contract price.
- When more than one major phase is being constructed at different locations on the project site, supervision 3 must be assigned to each phase when work of that contract is being performed. When performing construction work to maintain the progress schedule requires extended hours, multiple shifts, and additional work days, adequate supervision shall be required for each Contractor during these times. The competence level and ability of supervisory personnel must be adequate to perform the construction activities involved and shall be in accordance with requirements indicated elsewhere in the Contract Documents.

§ 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.

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§ 3.3.4 Contractor shall lay out his/her own work and be responsible for all lines, elevations and measurements of the building and other work executed by him under the Contract. He/She must exercise proper precaution to verify the figures shown on the Drawings before laying out the work and will be held responsible for any errors resulting from his/her failure to exercise such precaution.

Contractors whose failure to perform his/her Work or whose negligence in performing his/her Work, negatively impacts other Contractors' work shall be responsible for damages incurred by the other Contractors that are necessary to maintain the project schedules, all as is more fully set forth in the further provisions of the Contract Documents including, without limitation, Section 6.2.5 of the General Conditions.

## § 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 approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.2.1 Standard of Quality: The various materials and products specified in the Specifications by name or description are given to establish a standard of quality and of cost for bid purposes.

- It is not the intent to limit the Contractor to any one material or product specified, but rather to describe as the minimum standard.
- .2 When proprietary names are used as the "Basis of Design", for specified products or equipment, they shall be followed by the words, "or approved equal in quality necessary to meet the specifications", unless otherwise indicated elsewhere in the Contract Documents.

§ 3.4.2.2 The Architect will evaluate alternatives and substitutions and shall be the sole judge of whether the alternatives (substitutions), are acceptable or not.

- .1 The burden of proving the alternatives (substitutions), are equal or better to the specified product is that of the Contractor.
- .2 Contractor shall submit request for substitution in accordance with substitution procedures indicated elsewhere in the Contract Documents.
- .3 Any alternative names or products which do not meet the Specifications will not be accepted.

§ 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

§ 3.5.1 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.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

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**§ 3.5.3** The Contractor shall forward guarantee and warranty registration cards to the manufacturers in the name of the Owner showing date of acceptable Substantial Completion of the Work as the beginning date for guarantee and warranty periods.

.1 All warranties and guarantees shall be in accordance with requirements indicated in applicable Sections of the Contract Documents.

### § 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. Unless otherwise provided in the Contract Documents, the Owner shall secure and pay for the building permit as well as for other permits, fees, 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.

- .1 It shall be the obligation of the Contractor to review the Contract Documents and to determine and to notify the Owner and Architect of any discrepancy between building codes and regulations of which the Contractor has knowledge or should be reasonably able to determine.
- .2 The Contractor shall not violate any zoning, setback or other requirements of applicable laws, codes and ordinances, building codes, rules or regulations. The Contractor shall promptly notify the Architect in writing, and necessary changes shall be accomplished by appropriate Modification.
- .3 Contractor to pay for individual licenses.

§ 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 14 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 that an equitable adjustment be made 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 Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim 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

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§ 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,

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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

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§ 3.9.1 The Contractor shall employ a full-time competent superintendent and necessary assistants, acceptable to the Owner and the Architect, who shall be in attendance at the Project site during performance of the Work and until Final Completion of all Work including all corrective and punch list items. 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 notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice 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 and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

- .1 Within fifteen (15) days after the date of the Notice to Proceed, the Contractor shall submit to the Architect, on forms supplied by the Architect, a Critical Path Method (CPM) with arrow network diagram Progress Schedule upon which shall be indicated the dates for starting and the dates for completion of all contracts and all divisions of the work in a manner which will coincide with the Time for Completion. Contractor's Construction Schedule shall be in accordance with requirements indicated elsewhere in the Contract Documents.
- .2 The Contractor shall cooperate and consult with other Prime Contractors during the construction of this project. The Contractor shall schedule and execute his/her Work so as to avoid delay to other Prime Contractors. The Contractor is financially responsible to the other Prime Contractors for delay caused by him/her to other Prime Contractors on the Project who are intended to and shall be third party beneficiaries of the Contractor's promise herein above stated in accordance with the further provisions of the Contract Documents, including, without limitation, Section 6.2.5 of the General Conditions. If contrary to the foregoing, another Prime Contractor is allegedly responsible, the Contractor and its Surety shall indemnify and Hold Harmless the Owner and Architect for such claims, losses or delays of any kind made by another Prime Contractor; provided however, that this indemnity obligation is for the sole and exclusive benefit of the Owner and Architect and shall not be applied to the benefit of any Prime Contractor.

.3 The Contractor shall immediately, after being awarded the contract, prepare and submit to the Architect, a submittal schedule which will be reviewed by the Architect for the orderliness of the submittals by the Contractor. This schedule shall be provided to the Architect for approval by the Architect within fourteen (14) days of receipt of Contract by the Contractor. The schedule shall be coordinated with the Project's Construction Schedule and shall allow the Architect reasonable time to review submittals.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably 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, or fails to provide submittals in accordance with the approved 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.

§ 3.10.4 The General Construction Work Contractor (and/or the assigned lead Contractor) shall be the scheduling Coordinator and shall perform all duties and assume all of the responsibilities of the Scheduling Coordinator as set forth in the Contract Documents and shall in addition to the requirements of other sections of the Contract Documents.

- .1 If the General Construction Work Contractor fails to perform its duties as the Scheduling Coordinator adequately or to the Owner's satisfaction, the Owner may, in addition to its other rights and remedies, appoint a substitute Scheduling Coordinator who shall act in the place and with the authority of the original Scheduling Coordinator. In that event, the Owner may, in its sole discretion, choose one of the Separate Prime Contractors or an Independent Consultant as the substitute Scheduling Coordinator. The cost and expense incurred by the Owner to engage such substitute scheduling Coordinator shall be charged to and borne by the General Construction Work Contractor and its Surety.
- .2 The Contractor's failure to cooperate and participate with the Owner and separate Prime Contractors in the development and review of construction schedules as provided in this Section 3.10 shall be a material breach of its obligations, entitling the Owner to exercise all rights and remedies under the Contract Documents and applicable law.
  - .1 In no event shall any revision to any construction schedule constitute the basis for an adjustment in the Contract time or the Contract Sum unless such adjustment is agreed to by the Owner, the Architect and achieved by a Change Order.
  - .2 Float shall belong to the Project and all "float time" belongs exclusively to the Owner and may be used as the Owner, if in its sole discretion determines.

## § 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and 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.

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§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how 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 the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect 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 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.

§ 3.12.10.1 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 be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately 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 and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and 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.

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§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

### § 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, 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, or patching shall be restored to the condition existing prior to the cutting, fitting, or 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 construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its 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 and 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 the Owner shall be entitled to reimbursement from the Contractor.

#### § 3.16 Access to Work

The Contractor shall provide the Owner and Architect with 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 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 an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

#### § 3.18 Indemnification

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§ 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 which would otherwise exist as to a party or person described in this Section 3.18.

.1 Contractor, for itself, its successors and assigns, agrees to indemnify and save Owner, the individual members (past, present and future), its successors, assigns, employees, agent, Architect, Engineers, harmless from and against any and all claims, demands, damages, actions or causes of action by any party,

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together with any and all losses, costs or expenses in connection therewith or related thereto, including, but not limited to, attorney fees and costs of suit for bodily injuries, death or property damage arising in or in any manner growing out of the work performed, or to be performed under this Contract. Contractor and its successors and assigns agree to indemnify the Owner, its individual members (past, present and future), its successors, assigns, employees, agents, Architect, and Engineers against all fines, penalties or losses incurred for, including, but not limited to, attorney fees and costs of suit, or by reason of the violation by Contractor in performance of this Contract, or any ordinance, regulation, rule of law of any political subdivision or duly constituted public authority. Without limiting the foregoing, the Contractor, at the request of Owner, its individual members (past, present, future), its successors, assigns, employees, agents, Architect, or Engineers, agree to defend at the Contractor's expense, any suit or proceeding brought against Owner, its individual members (past, present, future), its successors, assigns, employees, agents, Architect, Engineers due to, or arising out of the work performed by the Contractor.

The Contractor assumes the entire risk, responsibility, and liability for any damage or injury of every kind and nature whatsoever (including death, resulting therefrom) to all persons, whether employees of the Contractor or otherwise, and to all property (including the Work itself) caused by, resulting from, arising out of or occurring in connection with the execution of the Work, or in preparation for the Work, or any extension, modification, or amendment to the Work by the Change Order or otherwise. To the fullest extent permitted by law, the Contractor and its Surety shall indemnify and save harmless the Owner, the Architect, the Architect's Consultants, agents and employees of any of them (herein collectively called the "Indemnitees") from and against any and all liability, loss, damages, interest, judgements and liens growing out of, and any and all costs and expenses (including, but not limited to, counsel fees and disbursements) arising out of, relating to or incurred in connection with the Work including, any and all claims, demands, suits, actions or proceedings which may be made or brought against any of the Indemnitees for or in relation to any breach of the Contract for Construction or any violation of the laws, statutes, ordinances, rules, regulations, or executive orders relating to or in any way affecting the performance or breach of the Contract for Construction, whether or not such injuries to persons or damages to property are due or claimed to be due, in whole or in part, to any negligence of the Contractor or its employees, agents, subcontractors, or materialmen, excepting only such injuries and/or damages are the result of the sole gross negligence of the Owner or Architect.

§ 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.

### § 3.19 Re-Design

§ 3.19.1 If the Contractor makes, or causes to be made, due to approval of substitute equipment or otherwise, any substantial change in the form, type, system and details of construction from those shown on the Drawings, he/she shall pay for all costs arising from such changes. The Contractor shall pay all Architectural and Engineering fees required to check the adequacy of such changes. Any changes or departures from the construction or details shown shall be made only after written approval from the Architect.

§ 3.19.2 The Contractor represents and warrants the following to the Owner (in addition to the other representations and warranties contained in the Contract Documents), as an inducement to the Owner to execute the Owner-Contractor Agreement, which representations and warranties shall survive the execution and delivery of the Owner-Contractor Agreement and the final completion of the Work.

- .1 that he/she is authorized to do business in the State, County, and/or City where construction will take place at the Project and is properly licensed by all necessary governmental and public authorities having jurisdiction over him/her and over the Work at the site of the Project;
- .2 that he/she is familiar with all Federal, State, Municipal and department laws, ordinances and regulations, which may in any way affect the Work of those employed herein, including but not limited to any special acts relating to the Work or to the Project of which it is a part;
- that such temporary and permanent Work required by the Contract Documents as is to be done by him/her, .3 can be satisfactorily constructed and used for the purposes for which it is intended;
- .4 that he/she is familiar with local trade jurisdictional practices at the site of the Project;
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- .5 that he/she has carefully examined the plans; specifications and the site of the Work, and that from his/her own investigations, he/she has satisfied himself/herself as to the nature and location of the Work, the character, quality and quantity of the surface and subsurface materials likely to be encountered, the character of equipment and other facilities needed for the performance of the Work, and the general local conditions, and all other materials which may in any way affect the Work or his/her performance;
- that he/she has determined what local ordinances, if any, will affect his/her Work. He/She has checked for .6 any County, City, Borough, or Township rules or regulations applicable to the area in which the Project is being constructed and in addition, for any rules or regulations of other organizations having jurisdiction, such as chambers-of-commerce, planning commission, industries, or utility companies who have jurisdiction over property on which the Work will be performed. Any costs of compliance with local controls are included in the prices/bid, even if documents of such controlling agencies are not listed specifically in the Contract Documents.

## **ARTICLE 4 ARCHITECT**

### § 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 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.

### § 4.2 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.

§ 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 promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) 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

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

.1 All project communications shall be in typewritten 8-1/2" x 11"

form.

.2 Notice of proposed changes. The Architect shall notify the Contractor of all proposed changes to the Contract Documents, after award of the Contract via type written Bulletin, or in the case of minor changes in the work, via other written instrument (letter or facsimile). The Contractor shall submit a proposal to

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increase or decrease the Contract Sum for approval prior to commencing with the Work change unless there is no change in the Contract Sum or time.

§ 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 13.4.2 and 13.4.3, whether or not the 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, 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 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 order 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 Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 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.

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§ 4.2.15 Reference in the technical provisions of the Specifications to standard specifications and test methods including those of the American Society for Testing and Materials (ASTM), the American Iron and Steel Institute (AISI), the American National Standards Institute (ANSI), the American Society of Mechanical Engineers (ASME), the American Society of Heating, Refrigeration and Air Conditioning Engineers (SSGREA), the Factory Mutual System (FM), the National Fire Protection Association (NFPA), Federal Specifications, and other similar nationally recognized technical societies and agencies shall refer to the editions and revisions current with the date of the Contract Documents.

§ 4.2.16 The Architect's decision with respect to proposed substitutions of material or equipment specified by trade name shall be final. The Architect reserves the right to waive Specifications and to accept a proposed substitution which in his/her opinion is superior to the material or product specified, or to limit the Specification to the product or equipment specified.

§ 4.2.17 Approval of substitutions shall not relieve the Contractor of responsibility for adequate fulfillment of all the various parts of the Work, nor from specified guarantees and maintenance. Modification of adjacent or connecting Work required due to any substitution approval shall be provided as part of the substitution.

§ 4.2.18 Insofar as practicable, except as otherwise specified or shown, the material or product of one manufacturer shall be used throughout the Work for each specified purpose.

§ 4.2.19 Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in strict accordance with the manufacturer's directions. Should such directions conflict with the Specifications, the Contractor shall request clarification from the Architect before proceeding.

# **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 the 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 Subsubcontractor.

#### § 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, within thirty (30) days, after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice 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 The names of all Subcontractors and material suppliers shall be submitted for approval to the Architect and Owner not later than fifteen (15) days after the date of the Award of Contract unless otherwise authorized by the Architect.

- .1 The list of proposed Subcontractors shall include a description of the materials and equipment each proposes to furnish and install in the Work..2 The description shall be in sufficient detail to allow the Architect to determine general conformance to Contract requirements.
- .3 Approval of the submittals required under this Article shall not relieve the Contractor from conformance to Contract requirements.
- .4 If the Architect and/or the Owner make reasonable objection to a Subcontractor, the Contractor shall
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substitute a Subcontractor reasonably acceptable to the Architect and the Owner at no additional cost.

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

§ 5.2.5 Written confirmation of award of each major subcontract shall be submitted to the Architect, in form subject to his/her approval, within seven (7) days after receipt of Architect's approval of proposed Subcontractor list as provided under Section 5.2.3 (above).

### § 5.3 Subcontractual Relations

By appropriate written agreement, 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 that the Contractor, by these Contract 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 Subsubcontractors.

## § 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; 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 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 term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance.

§ 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.

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§ 6.1.3 The General Construction Work Contractor, (and/or the assigned lead Contractor), shall act as the scheduling coordinator for all work of the Separate Prime Contractors and any other activities of the Owner's own forces and shall have direct responsibility for scheduling and coordination of all Work, as more specifically set forth in Article 3. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its 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 or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has 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 notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work 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. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

**§ 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 that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

.1 Should the Contractor cause damage to the work or property of any Separate Contractor on the Project, the Contractor shall, upon due notice, promptly settle with such other Contractor by agreement or otherwise account of any damage alleged to have been so sustained, the Contractor shall defend such proceeding at his/her own expense, and if any judgement against the Owner arises therefrom, the Contractor shall pay or satisfy it and shall reimburse the Owner for any attorney's fees and court costs which the Owner has incurred.

§ 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.

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§ 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. The Contractor shall proceed promptly with changes in the Work, 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 7.3.4.

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§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine 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 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .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, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 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.

§ 7.3.6.1 For any extra work or portion thereof performed by the Prime Contractor, the cost to the Owner shall include the cost of the extra work plus a maximum allowance of fifteen (15%) percent for overhead and profit.

- .1 For any extra work or portion thereof performed by Subcontractor(s), the cost to the Owner shall include the cost of the extra work to the Subcontractor plus a maximum allowance of ten (10%) percent for overhead and profit, plus the Prime Contractor's overhead and profit not to exceed five (5%) percent of the Subcontractor's cost.
- .2 The cost of bonds and insurance shall be included as part of the overhead and profit.

§ 7.3.6.2 Change Orders shall include all costs, including the cost of preparation of the Change Order, all impact and ripple costs associated with modifications or delays to the work, and all costs associated with modifications to other work.

- The Prime Contractor shall furnish all necessary documentation to support the additional costs, including, .1 but not limited to the following:
  - .1 Copy of the Subcontractor's proposal.
  - .2 Complete breakdown of all costs for labor and materials.
  - .3 Complete breakdown of related costs.
  - .4 Other information as may be requested by the Architect.

§ 7.3.6.3 The overall cost of the Change Order shall be all inclusive and once accepted by the Owner, it shall be considered full and final.

§ 7.3.6.4 No additional time will be granted to the Contractor for minor Change Orders unless each individual Change Order totals more than \$100,000.

§ 7.3.7 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.

§ 7.3.8 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.

§ 7.3.11 if the Contractor claims that certain Work constitutes an addition, deletion, or change to the Work, the Contractor shall notify the Owner and Architect at least fourteen (14) days before proceeding with such Work, or else any claim by the Contractor for any adjustment to the Contract Sum or the Contract Time on account thereon shall be deemed waived.

- .1 If the Contractor gives timely notice and the Owner directs the Contractor to proceed with such disputed Work as part of its Work or as a minor change in the Work, the Contractor shall promptly proceed with such disputed Work, subject to later resolution in accord with the requirements of the Contract Documents.
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- .2 In that event, the Contractor shall present, at the end of each day that the Contractor performed the disputed Work, a summary of the day's costs attributable to the disputed work, including labor hours and material costs, for verification by the Owner and the Architect.
- .3 Only the costs as verified by the Owner and Architect shall be used in computing any increase in costs for the purposes of the adjustment to the Contract Sum, should it later be determined that the Contractor is entitled to such adjustment.
- .4 Upon request, the Contractor shall provide to the Owner and Architect full supporting documentation for all costs claimed.
- .5 If and to the extent that the Contractor fails to submit such summary each day, its claim for an adjustment to the Contract Sum shall be deemed waived.

## § 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

# **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, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time. Contractor agrees to increase manpower, increase work hours, and to increase equipment necessary to maintain the Project Construction Schedule, and when also requested by the Architect and the Owner, and shall be without additional cost or charge to the Owner.

§ 8.2.4 Work shall commence within ten (10) days of the issuance by Owner of a Notice to Proceed and shall proceed uninterrupted to Final Completion. The Contractor acknowledges and recognizes that the Owner is entitled to full and beneficial occupancy and use of all or part of the completed Work in accordance with the Milestone Dates set forth in other sections of the Contract Documents, as per approved Schedule, and that the Owner has made arrangements to discharge its public obligations based upon the Contractor's achieving Substantial Completion of all of the Work within the Contract Time. The Contractor further acknowledges and agrees that if the Contractor fails to complete substantially or cause the Substantial Completion of any portion of the Work, as required by the Project Construction Schedule and/or within the Contract Time, the Owner will sustain extensive damages and serious loss as a result of such failure. The exact amount of such damages will be extremely difficult to ascertain. Therefore, the Owner and the Contractor agree as set forth (below):

.1 If the Contractor fails to achieve partial completion within the requirements of the Milestone Dates or the approved Schedule or to achieve Substantial Completion of all or part of the Work when and as required by the Project Construction Schedule, and/or within the Contract Time, the Owner shall be entitled to retain or

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recover from the Contractor and its Surety, as liquidated damages and not as a penalty, the amounts indicated in other sections of the Contract Documents and commencing upon the first day following expiration of the Project Construction Schedule and/or the Contract Time, as the case may be, and continuing until the actual Date of Substantial Completion.

### § 8.2.5 Adherence to Schedule

- The Owner reserves the right to withhold monthly progress payments if the Contractor is behind schedule, .1 unless the Contractor documents, in writing, any delays that are not the fault of the Contractor and to which the Owner and Architect agree.
- .2 Monthly progress payments will only be released after the Contractor reaches the status of completion for that month contemplated by the Construction Schedule.

## § 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 (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and litigation; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

.1 Any direct claim against the Owner for delay costs caused by another Prime Contractor shall be subject to the provisions of Section 8.3.3

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

§ 8.3.3 No payment shall be made by the Owner to the Contractor as compensation for damages for any delays or hindrances from any cause whatsoever in the progress of the Work, notwithstanding whether such delays are avoidable or unavoidable. The Contractor's sole remedy for delays shall be an extension of time only, pursuant to and only in accordance with Section 8.3. Such extension shall be a period equivalent to the time lost by reason of and all of the aforesaid causes. In no event shall the Owner or Architect be held responsible for any loss or damage or increased costs sustained by the Contractor through any delays caused by the Owner or Architect or any other Prime Contractor. If, contrary to the foregoing provision, the Contractor commences a direct action against the Owner or Architect seeking to recover delay costs and fails to substantially prevail in its claim that the Owner was the cause of the alleged delay, the Contractor shall reimburse the Owner and the Architect as the case may be for any attorneys' fees, professional fees and all other costs and expenses incurred by them associated with analyzing, defending or otherwise opposing any such action; provided, however, that where the delay alleged by the Contractor arises from acts, omissions, or default of another Prime Contractor or another Prime's Subcontractors and Suppliers, then the provisions of Section 8.3.1 shall apply.

.1 Where the cause of the delay is due to weather conditions, extension of time shall be granted only for unusually severe weather, as determined by reference to historical data. The term "historical data" as used in the preceding sentence shall be construed according to this formula: Average rainfall (or snow or low temperature) for the past five years for the month in question, plus 10 percent. Weather shall not be deemed to be unusually severe unless it is more than 10 percent more severe for that month over the last five years.

§ 8.3.4 The Contractor is required to submit at any construction conference considering any claim and at any proceeding considering an extension of time, and in all subsequent administrative proceedings, all files, records, and the documents of whatever kind pertaining to the Contractor's performance of the project work, the job budget, the summary of all supporting data worksheets and other documents prepared in connection with the submittal of the Contractor's successful bid.

## ARTICLE 9 PAYMENTS AND COMPLETION

# § 9.1 Contract Sum

§ 9.1.1 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.

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§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

## § 9.2 Schedule of Values

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

§ 9.2.1 Contractor must provide draft copies of the Schedule of Values, within fifteen (15) days from the Notice to Proceed. Submit two (2) copies to the Architect.

- .1 Schedule of Values shall include cost of work at the/each Building and for the/each Project and shall include the Architect's Special Project Number. Schedule of Values shall include materials and installation and in accordance with each Specification Section as listed in the Specification Index, as shown on the Drawings and/or as directed by the Architect. Contractor shall include separate line items for the following:
  - .1 Bonds.
  - .2 Insurance.
  - .3 Mobilization,
  - .4 General Conditions.
  - .5 Contractor's Construction Schedule,
  - .6 Submittals (Product Data, Samples, and Shop Drawings),
  - .7 As-Built Drawings and similar requirements as per Section for Closeout Documents,
  - .8 Punch List items and Closeout Documents per Section for Closeout Documents,
  - .9 Final Cleaning,
  - .10 Other items, as directed by the Architect.
- Contractor shall enclose with the Schedule of Values, copies of invoices and/or cancelled checks from .2 Bonding and Insurance Agents for the required cost of the coverage for the project being billed.

#### § 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. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers and shall reflect retainage if provided for in the Contract Documents. The application for payment shall be on approved AIA G702 Forms and shall be accompanied by a partial waiver of liens in a form acceptable to the Owner and Architect.

**§ 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 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.

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**§ 9.3.2.1** To encourage early purchase, Owner may pay for stored materials and equipment. The following procedures must be followed in order to obtain payment.

- .1 A certificate of insurance naming the Owner as loss beneficiary for the full dollar amount representing the materials stored.
- .2 A Consent of Surety in the amount being requisitioned, said Surety being the Bonding Company of the Prime Contractor.
- .3 Materials to be stored in warehouse must be inspected by the Architect/Engineer and the Contractor will not receive extra compensation for storage costs.
- .4 Any time and travelling expenses for the Construction Inspector to visit and inspect equipment stored will be borne by the Contractor making the off-site storage request.
- .5 Payment invoices for materials stored off site shall be so noted.
- .6 After the receipt of the above, the Construction Inspector will endorse same and forward to the Owner for their approval.
- .7 Payment invoices not following the above format will be rejected in total.
- .8 There will be no storage space available in the existing building(s). Space in new building(s) may be used for storage only if approved, in writing, by the Architect/Engineer and all Contractors having work in the area.
- .9 The Contractor will be paid for storage materials no more than the actual or replacement value of the materials. The Contractor will furnish vendors price lists, priced inventories or other documentation to support claims for payment of materials stored on or off 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, suppliers, or other persons or entities that 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 (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reasons for withhold 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 in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. 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. 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 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

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**§ 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 suppliers 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;
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.
- deliberate delay in the submission for approval of names of Subcontractors, Materialmen, sources of .8 supply, product data, shop drawings and samples; or
- .9 otherwise failing to comply with the requirements of the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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

§ 9.5.4 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 supplier 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 Contractor shall reflect such payment on its next Application for Payment.

- If the Contractor disputes any determination by the Architect with regard to any Certificate of Payment, the .1 Contractor nevertheless expeditiously shall continue to prosecute the Work.
- .2 The failure of the Owner to retain any percentage payable to the Contractor or any change in or variation of the time, method or condition of payments to the Contractor shall not release or discharge to any extent whatsoever, the Surety upon any bond given by the Contractor hereunder. The Owner shall have the right, but not the duty, to disregard any schedule of items and costs that the Contractor may have furnished and defer or withhold in whole or in part any payment if it appears to the Owner, in its sole discretion, that the balance available in the Contract Sum as adjusted and less retained percentages, may be insufficient to complete the Work.
- Notwithstanding any provision of any law to the contrary, the Contractor agrees that the time and .3 conditions for payment under the Contract for Construction shall be as stated in the Contract for Construction and in the Contract Documents. The Contractor specifically agrees that the Owner's failure to give, or timely give notice of:
  - .1 any error in an invoice or application for payment submitted by the Contractor for payment; or
  - any deficiency or non-compliance with the Contract Documents with respect to any Work for .2 which payment is requested, shall not waive or limit any of the Owner's rights or defenses under the Contract for Construction and the Contract Documents, or require the Owner to make a payment in advance of the time, or in an amount greater than, as provided by the Contract for Construction.
- The Contractor shall make payments to its Subcontractors in accordance with the provisions of any applicable law governing the time, conditions, or requirements for payment to its Subcontractors, and shall comply with the provisions of any such law.
  - .1 The Contractor will pay its Subcontractors no later than fifteen (15) days after receipt of a payment from the Owner which includes payment for the Work of any such Subcontractors.
  - The Contractor shall require its Subcontractors, by appropriate agreement, to pay their .2 Subcontractors and Suppliers (of any tier) within the same time.

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The Contractor and its Surety shall indemnify and defend the Owner any loss, cost, expenses, or .3 damages, including Attorney's fees arising from or relating to the Contractor's failure to comply with such law.

### § 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 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 and suppliers 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 or supplier, except as may otherwise be required by law.

**§ 9.6.5** The Contractor's payments to 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 or provided by 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, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

#### § 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' 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 shutdown, delay and startup, plus interest as provided for in the Contract Documents.

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# § 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.

.1 Owner's beneficial occupancy must be approved by all governing authorities having jurisdiction and by issuance of a temporary or permanent "Certificate of Occupancy" and in accordance with all applicable Codes and Regulations.

Substantial Completion occurs when each of the following conditions precedent has occurred: .2

- .1 the Work has been sufficiently completed in accordance with Contract Documents so that the Owner obtains beneficial use and occupancy of the Work;
- .2 Certificates of Occupancy and any other permits, approvals, licenses, and other documents from any governmental authority having jurisdiction thereof necessary for the beneficial occupancy of the Project have been received by the Owner; and
- the Architect has issued a certificate of Substantial Completion. The date of Substantial .3 Completion is the date certified by the Architect in accord with the Contract Documents and shall follow the Contractor's Notification for Substantial Completion inspection and the Architect's inspection of the Project.

§ 9.8.2 Unless otherwise indicated in the Contract Documents, no later than thirty (30) calendar days, prior to the date scheduled for Substantial Completion, the Contractor shall prepare and submit to the Architect and Owner, a comprehensive punch list of items remaining to be completed or corrected.

.1 No later than ten (10) calendar days prior to the date for Substantial Completion, the Architect and/or Owner may add additional items requiring completion or correction.

.2 The Contractor shall immediately proceed with the Work required by the punch list and shall complete and correct items on or added thereto by the date scheduled for Substantial Completion.

When the Contractor determines that the Work has reached Substantial Completion, or when the .3 Owner, Architect so determine and direct the Contractor to do so, the Contractor shall request the Architect's final inspection to determine Substantial Completion. In addition, the Contractor shall prepare and submit to the Architect and Owner its final Application for Payment submitted in compliance with the requirements of the Contract Documents and shall thoroughly reinspect the Work; prepare and submit to the Architect and Owner a comprehensive final punch list of any and all items remaining to be completed or corrected (whether or not included on any previous punch list).

- .1 Within fourteen (14) calendar days after receipt of the Contractor's request and final punch list, the Architect will inspect the Work to determine whether Substantial Completion has occurred.
- .2 If the Architect determines that Substantial Completion has not occurred, it shall advise the Contractor and the Owner of the reasons for their determination and the Contractor shall continue with the Work and request another inspection for Substantial Completion and submit another final punch list after the concerns of the Architect have been addressed.
  - The fees and expenses incurred by the Owner for services of the Architect as a result of any additional re-inspections of the Work, shall be paid by the Contractor or its Surety.
- When the Architect determines after an inspection under this Section that Substantial Completion .3 has occurred the Architect shall:
  - .1 add to the Contractor's final punch list any additional items which they discover which also need to be completed or corrected;
  - determine and certify the amount required to complete each item on the punch list, basing .2 such determination upon the amount the Owner would have to expend or incur to complete each item if the Contractor failed to do so; and
  - .3 prepare and issue a certificate of Substantial Completion, which shall establish the date of Substantial Completion.
- The Contractor shall proceed promptly to complete and correct items on the final punch list within thirty (30) calendar days of the date of Substantial Completion or prior date established for Final Completion in other sections of the Contract Documents.
- The failure of items to appear on any punch list shall not constitute an acceptance of any Work not .5 in accord with the Contract Documents nor relieve the Contractor or its Surety of responsibility with respect thereto.

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- Warranties required by the Contract Documents shall commence on the approved date of .6 Substantial Completion of the Work for the entire project unless otherwise provided in the Certificate of Substantial Completion.
- .7 The Architect shall submit the Certificate of Substantial Completion to the Owner and Contractor. If not completed within this time, the Owner may proceed to finish the Work as otherwise provided in this Agreement.

§ 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; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and 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 the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the 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 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.

§ 9.9.4 As portions of the Project are completed and occupied, the Contractor shall ensure the continuing construction activity will not unreasonably interfere with the use, occupancy and quiet enjoyment of the completed portions thereof.

- .1 The Contractor agrees to coordinate the Work with the Architect and the Owner in order to minimize disturbance to occupied portions of the structure.
- .2 In the event performances or scheduled events by the Owner are conducted in close proximity to the Work in progress, the Contractor agrees to cease all Work which may disturb the Owner's occupants at the site.

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### § 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's 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. 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 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, (3) a written statement that the Contractor knows of no 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, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and 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, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance 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 the lien, claim, security interest, or encumbrance, 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, corrected, 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 the 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.

.1 If more than one inspection for Final Completion is required, the Contractor will be billed and responsible for the professional fees and services of the Architect.

.2 Following Substantial Completion, in the event the Contractor or their Subcontractor fails to complete the list of items of the Work instructed by the Architect to be corrected or completed within fourteen (14) days after the date of receipt of Certificate of Substantial Completion, the Owner may:

- exercise any available remedies to correct or complete deficient work or retain a third party to .1 correct or complete such work at the cost of the defaulting Contractor; and
- retain and deduct from any payments or retention otherwise due to the defaulting Contractor any .2 fees and expenses for services required to be provided by the Architect more than twenty-one (21) days after the

Date of Substantial Completion.

## (Paragraph Deleted)

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a 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.

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# 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.

- .1 The General Contractor (and/or assigned Lead Contractor) shall provide all necessary temporary enclosures, guardrails, barricades, etc., to adequately protect all workers and public from possible injury subject to Section 10.1.1.2 (below).
- .2 The General Contractor (and/or assigned Lead Contractor) shall be responsible for the general safeguarding of the Project, for gaining compliance with the safety requirements from all other Contractors and parties engaged in operations at the site and shall act as the Project Site Representative with regard to all safety inspections required and shall perform all necessary functions for this purpose.

# § 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, a Subcontractor, or a Sub-subcontractor; 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 implement, 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 the owners and users of adjacent sites and utilities of the safeguards.

§ 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. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is 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, notice of the 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.

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## § 10.2.9 Lost or Stolen Materials

§ 10.2.9.1 The Contractor shall protect all materials and equipment and equipment for which he/she is responsible, which is stored at the Project Site for incorporation in the Work, or which has been incorporated into the Work. He/She shall replace at his/her expense all such materials and equipment which may be lost, stolen or damaged, whether or not such materials or equipment have been entirely or partially paid for by the Owner.

### § 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. 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 notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's 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 the material or substance or who are to perform the task of removal or safe containment of the 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 by the amount of the Contractor's reasonable additional costs of shutdown, 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 hazardous 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 hazardous 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 reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances 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 reimburse 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.

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# ARTICLE 11 INSURANCE AND BONDS

# § 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

- .1 Certificate of insurance shall be submitted within ten (10) business days upon notification of award of Contract.
- .2 The Contractor may carry whatever additional insurance he/she deems necessary to protect himself/herself against hazards not covered by the Owner's Property Insurance, including coverage for theft, collapse, water damage, materials and equipment stored on the site, and for materials and equipment stored off site, and against loss of owned or rented capital equipment and tools owned by mechanics or any tools, equipment, scaffolding, staging, towers and forms owned or rented by the Contractor, the capital value of which is not included in the cost of the work. The Owner's "All Risk" Insurance does not cover theft of materials unless installed and made an integral part of the building. This loss must be assumed by the Contractor.

**§ 11.1.2** The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

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

**§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within five (5) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

# § 11.2 Owner's Insurance

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§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

- .1 The Property Insurance obtained by the Owner shall include collapse and water damage, to the extent covered by the Owner's "All Risk" insurance.
- .2 The Owner agrees to be responsible for losses not covered by Property Insurance due to statutory deductible provisions.
- .3 The fact that the Owner is furnishing Property Insurance shall not be interpreted to relieve the Contractor of his/her obligation to complete the work without additional cost to the Owner beyond the Contract amount, except as provided in Section 11.2.1.2 (above).

**§ 11.2.2 Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the

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insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

**§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance.** Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been coverage, the cost of the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

## (Paragraphs Deleted)

### §11.5 Adjustment and Settlement of Insured Loss

**§ 11.5.1** A loss insured under the property insurance required by the Agreement 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 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

**§ 11.5.2** Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

### 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, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the cost of correction, shall be at the Contractor's expense.

#### § 12.2 Correction of Work

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#### § 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of

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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 any 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 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 2.5. The Contractor shall bear all costs of correcting any and all Work not complying with this warranty, and the Contractor and its Surety shall indemnify the Owner for all costs, expenses, loses, and/or damages incurred by the Owner, including Attorney's fees, additional testing and inspections and compensation for the services and expenses of the Architect made necessary thereby. This warranty is in addition to any other warranty or remedy provided elsewhere in the Contract Documents and shall survive the expiration of any such other warranty, acceptance of a final payment for the Work, and the termination of the Contract for Construction.

§ 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 of the Owner or Separate Contractors, whether completed or partially completed, 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.

§ 12.3.1 The Contractor and its Surety guarantee to make good, repair and/or correct, at no cost or expense to the Owner, any and all latent defects hereafter discovered, provided only that notice in writing, shall be given by the Owner to the Contractor within one (1) year of the discovery of such defects.

This obligation shall survive the termination of any or all other obligation or obligations under the Contract .1 Documents and it is agreed by the Contractor and its Surety that in the event the Owner is required to bring suit under this provision against the Contractor or its Surety to enforce this obligation, the Contractor and its Surety hereby waive any defense of the status of limitations.

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# **ARTICLE 13 MISCELLANEOUS PROVISIONS**

# § 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

Contractor must comply with codes, ordinances, rules, regulations, orders and other legal requirements of .1 public authorities, utility companies, National Board of Fire Underwriters, and others which bear on performance of Work. Deliver to the Owner, certificates and other required legal evidence and proof of compliance with the above.

# § 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 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 the assignment.

## § 13.3 Rights and Remedies

§ 13.3.1 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.

§ 13.3.2 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 thereunder, except as may be specifically agreed upon in writing.

## § 13.4 Tests and Inspections

§ 13.4.1 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 tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 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 13.4.1, 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 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 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.

§ 13.4.4 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.

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**§ 13.4.5** 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.

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

### § 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties 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.

### ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

### § 14.1 Termination by the Contractor

§ 14.1.1 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, their agents or employees, or any other persons performing portions of the

Work

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under contract with the Contractor (Paragraphs Deleted)

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 or under any order of any Court or other public authority having jurisdiction, the Contractor may, upon seven (7) additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner.

### § 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 or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner 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' 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 costs of finishing the Work, including compensation for the services of any Consultants and the Architect's services and expenses made necessary thereby, and the other costs and expenses identified hereinafter, exceed the unpaid balance of the Contract Sum, the Contractor and its Surety shall pay the difference to the Owner upon demand. The costs of finishing the Work include, without limitation, all reasonable Attorney's fees, additional title costs, insurance, additional interest because of any delay in completing the Work, and all other direct and indirect consequential costs, including, without limitation, Liquidated Damages for untimely completion as specified in the Contract Documents, incurred by the Owner by reason of, or arising from, or relating to the termination of the Contractor as stated herein.

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### § 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 under 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 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 performed as of the date of termination in accordance with the Contract Documents. The Contractor shall, as a condition of receiving the payment(s) referred to herein, execute and deliver all such papers, turn over all plans, documents and files of whatsoever nature required by the Owner and take all such steps, including the legal assignment of its contractual rights, as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Contractor. The Contractor warrants that it will enter into no subcontracts or other agreements that would adversely impact the Owner's rights or increase the Owner's obligations under this Section. In no event shall the Owner be liable to the Contractor for lost or anticipated profits or consequential damages, or for any amount in excess of the date of termination. The warranty and indemnity obligations of the Contractor and Surety shall survive and continue, notwithstanding and termination pursuant to this Section, with respect to the Work performed as of the date of termination.

### ARTICLE 15 CLAIMS AND DISPUTES

### § 15.1 Claims

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### § 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, a change in the Contract Time, 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. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

### § 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law.

- .1 No act or omission by the Owner or Architect, or by anyone acting on behalf of either shall be deemed or construed as a waiver or limitation of any right or remedy under the Contract Documents, or as an admission, acceptance, or approval with respect to any breach of the Contract for Construction or failure to comply with the Contract Documents by the Contractor, unless the Owner expressly agrees, in writing.
- .2 The Owner's exercise, or failure to exercise any rights, claims or remedies it may have arising out of or relating to the C9.8.ontract Documents shall not release, prejudice, or discharge the Owner's other rights

and remedies, nor shall it give rise to any right, claim, remedy or defense by any other person, including the Contractor, its Surety, any Subcontractor, or any other person or entity.

.3 Whenever possible, each provision of the Contract Documents shall be interpreted in a manner as to be effective and valid under applicable law. If, however, any provision of the Contract Documents, or portion thereof, is prohibited or found invalid by law, only such invalid provision or portion thereof shall be ineffective and shall not invalidate or affect the remaining provision of the Contract Documents or valid portions of such provision, which shall be deemed severable.

### § 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by 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 under this Section 15.1.3.1 shall 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.

- .1 The Owner has the responsibility to make a claim as promptly after recognizing or receiving notice of a condition which give reason for a claim.
- .2 The Contractor must provide notice of a claim prior to the submission of a payment requisition, not later than the submission of the second payment requisition following the date the Contractor knew or should have known of the condition giving rise to the claim.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

### § 15.1.4 Continuing Contract Performance

§ 15.1.4.1 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.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

### § 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

### § 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 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.

§ 15.1.6.2 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.

### (Paragraphs Deleted)

### § 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, 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. If an initial decision has not been

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rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a 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 the 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 receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, 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 15.1.7, 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 a retired Judge of the Superior Court of New Jersey mutually agreed to by the parties. 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

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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.

§ 15.3.4 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 All questions in dispute between the Owner and the Contractor shall be determined by the Courts having jurisdiction of the subject matter, and neither party shall submit to arbitration by the American Arbitration Association or any other arbitration agency.

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## SECTION 00800 - SUPPLEMENTARY GENERAL CONDITIONS

# PART 1 - GENERAL

# 1.1 GENERAL

- A. The following Supplementary General Conditions supplement, modify, change, delete from or add to the "General Conditions of the Contract for Construction", AIA Document A201, 2017 (**"General Conditions"**). Where any Article of the General Conditions is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect. These Supplementary General Conditions take precedence over any conflicting provisions in the General Conditions.
- B. Refer to other Sections in Division 1 "General Requirements" for additional modifications, deletions and additions to the "General Conditions of the Contract for Construction."

# **1.2 ARTICLE 2 OWNER**

# A. PARAGRAPH 2.2 - INFORMATION AND SERVICES REQUIRED OF THE OWNER:

Insert the following Paragraph:

2.2.1 The Architect will furnish the successful Contractor, the following number of sets of Drawings and Specifications, signed and sealed for purposes of obtaining NJ Uniform Construction Plan Review by the Municipal Construction Official having jurisdiction over the project to obtain Construction Permits.

## Single Overall Contract 3 Sets

B. Additional copies can be provided upon request in writing to the Architect at the Architect's reproduction costs.

## **1.3 SUBMITTALS**

A. Supplement Paragraph 3.12 "Shop Drawings, Product Data and Samples", as follows:

3.12.10 Contractor shall provide separate submittals for each Product with reference to Architect's Project Number. Contractor shall, <u>within ten (10) working days from the issue date of the Notice of Award</u>, forward to the Architect a <u>written submittal log</u> including all of the following information:

- .1 A list of all required submission items grouped by technical section division number as set forth in the Specifications,
- .2 If in variance with the Milestone Dates Specified in Section 01800, the dates upon which each submission will be made by the Contractor and the date by

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which the Contractor expects same to be returned to them by the Architect, allowing a reasonable time for review,

- .3 Critical items and long lead items shall be so noted on the log,
- .4 A sequence of submissions reasonably based upon the expected progress of the Project.
- .5 Submittals will be mandatory and shall meet time requirements established in other sections of the Bid Documents.
- .6 The Contractor shall complete the entire submission process as soon as possible but in no event later than the time set forth in Section 01800 after the Notice of Award. Exceptions may be made if so noted on the submission log, with good reason, and subject to the Architect's approval.
- .7 Omission of any required submittal item from the log does not relieve the Contractor of their obligation to make timely submissions of same. The Contractor shall keep their submission log up to date at all times. They will provide an updated copy to the Architect, at any time, upon request.

3.12.11 All project submittals are to be complete and provide all information required by the Bid Documents including, but not limited to, model numbers, applicable technical requirements, selected features, color, finish, and other options. Improperly prepared submittals sent to the Architect will be returned without action. The Contractor is responsible to field verify all dimension and conditions effecting the preparation of submittals and the Work.

3.12.12 Submittals provided by the Contractor on behalf of Subcontractors and suppliers must be reviewed for completeness and approved by the Contractor prior to submitting same to the Architect. The Contractor will be solely responsible for improperly prepared submittals.

3.12.13 Submittals are to be provided to the Architect consistent with the sequence of the proposed Work.

3.12.14 All fabricated Work shall require shop drawings.

3.12.15 Submittal Procedures: The Contractor's failure to follow proper procedures for submittals constitutes grounds for withholding of payments until such time as the Contractor is in compliance. Proper submittal procedures include all of those set forth elsewhere in this Specification including the following:

- .1 Failure to adhere to deadlines for completion of submittals and record/resubmittals.
- .2 Failure to provide submittals in good order as required by the Bid Documents.
- .3 Failure to provide submittals in relationship to the progress of the Work.
- .4 Performance of Work or part of the Work, without complete approved submittals.
- 3.12.16 Architect / Engineer's actions for submittals shall be as follows:
  - .1 Submittals returned to the Contractor marked "Approved" allow the Contractor to proceed with the Work.

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- .2 Submittals returned to the Contractor "Approved As Noted; "Resubmit For Record:"
  - .1 The Contractor <u>may</u> proceed with Work, however noted items by the Architect / Engineer (or any affected portion of the submittal), must be corrected and resubmitted to the <u>Architect's</u> office within ten (10) working days of Contractor's receipt of the original submittal. Final acceptance of all Work is subject to the Contractor's compliance with requirements of the Bid Documents.
- .3 Submittals returned marked "Returned for Corrections" require the Contractor to resubmit corrected or alternate data in accordance with the corrections indicated.
  - .1 The originals of the reproducible transparencies marked "Returned for Corrections" shall be corrected until approval is obtained. The Contractor shall provide such number of prints of transparencies marked "Approved" as required for the expeditious execution of the Work.
- .4 Submittals returned marked "No Action Taken:"
  - .1 The Contractor may <u>not</u> proceed with the Work. The Architect / Engineer will not review submittals so marked until the Contractor has properly completed the submittal or corrected the reasons stated thereon.
  - .2 Reasons for "No Action Taken" on a submittal include, but are not limited to the Contractor's failure to:
    - .1 Submit an approved Subcontractor or supplier.
    - .2 Indicate job specific product data such as catalog number, size, type or material on each submittal.
    - .3 Submit complete data, test reports or similar information, as required by the Bid Documents.
    - .4 Obtain prior approval for substitution.
    - .5 Submit documents in a legible or orderly fashion.
    - .6Adhere to any submittal requirements set forth in the Bid Documents.
    - .7 Submit only submittals which are called for in the Bid Documents, other submittals will not be reviewed by the Architect / Engineer.
- .5 Shop drawing submittals and color selection approvals by the Architect:
  - .1 The Contractor shall submit all shop drawing submittals within the specified time stipulated in Bid Documents.
  - .2 The Architect / Engineer shall release / return to the Contractor the approved color selections to coincide with the approved Milestone Schedule / Project Phasing if more than one construction phase is identified in Section 01800.
- .6 Long Lead Items:
  - .1 In addition to and concurrent with the submission of the "Schedule of Values", Contractor shall submit a list of all materials, equipment or components which are anticipated to require more than four weeks delivery, together with scheduled ordering and delivery time table.
  - .2 This will be discussed and reviewed regularly at the job meetings.
  - .3 Upon request by the Architect / Engineer, the Contractor shall be prepared to produce evidence of having placed orders for specific materials, equipment and components.

- .7 The Contractor will not be entitled to receive payment or Work performed by the Contractor for which submittals were required to be submitted for review and approval by the Architect. All Work installed in variance with the Bid Documents will be rejected.
- 3.12.17 Request for Substitutions:
  - .1 Pursuant to <u>N.J.S.A</u>. 18A:18A-15(d), requests for substitutions, for a requested approved equal product, will be reviewed for compliance with the Specifications based upon the data provided by the Contractor after the award of the project. Approval or rejection will be based on samples, technical data and other items submitted and will be reviewed once and only once for each such request.
  - .2 Submission of request for substitution shall constitute a representation by the Contractor that they:
    - .1 Have investigated the proposed product and determined that it is equal to or better than the specified product.
    - .2 Will provide the same variety for the proposed product as for the specified product.
    - .3 Will coordinate the installation and make other changes which may be required for the Work to be complete in all respects, including:
      - .1 Re-design.
      - .2 Additional components and capacity required by other Work affected by the change.
      - .3 Waives all claims for additional costs and time extensions which subsequently may become apparent and which are caused by the change.
  - .3 Substitutions will not be considered when acceptance would require substantial revision of the contract documents.
  - .4 Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals without separate written request.
  - .5 Substitution requests will not be considered when submitted directly by Subcontractor or supplier.
  - .6 When the proposed substitution <u>is not accepted</u>, Contractor(s) must provide the product (or one of the products, as the case may be) specified.
  - .7 The Contractor will be notified in writing within a reasonable time, verbal acceptance will not be valid.
  - .8 Acceptable substitutions will be added to the Bid Documents by appropriate modifications.
  - .9 Requests for substitution will be reviewed by the Fraytak Veisz Hopkins Duthie, P.C., Architects - Planners and their Engineer upon receipt of all the information requested in the following paragraph. Failure to provide the required information shall be cause for rejection of substitution request.
  - .10 Submittal for Substitutions:
    - .1 The Contractor shall begin the submission process as soon as possible after the Notice to Proceed, but in no event later than fifteen (15) working days after Notice to Proceed.

- .2 The Contractor shall sequence and time their submissions in a reasonable and orderly fashion. They will allow for sufficient time for the Architect's review as well as the transmission of same amongst all project participants.
- .3 In the case of color selections, the Contractor is responsible for the completion of all required and related submissions, including samples, prior to the Owner's selection of colors. Exceptions can be made for certain long lead items so identified on the submittal log.
- .4 The Contractor shall complete the entire submission process as soon as possible but in no event later than thirty (30) calendar days after Notice to Proceed, unless otherwise authorized by the Fraytak Veisz Hopkins Duthie, P.C., Architects Planners and their Engineer and/or the Owner due to the technical evaluation of the substitution(s).
  - .1 Exceptions may be made if so noted on the submission log, with good reason, and subject to the Architect's / Engineer's approval.
  - .2 Upon receipt by the Architect, they will review same and advise the Contractor if the log is acceptable.
  - .3 At no time will the Contractor unduly burden the Architect / Engineer with excessive or unreasonable submittals made at one time.
  - .4 An advertent omission of any required submittal item from the log does not relieve the Contractor of their obligation to make timely submissions of same. The Contractor shall keep their submission log up to date at all times. They will provide an updated copy to the Architect, at any time, upon request.
- .5 Submit three (3) copies of requests for substitutions, fully identified for product, material or method being replaced by substitution, including related Specification section and Drawing number(s), and fully documented to show compliance with requirements for substitutions. Submit the following:
  - .1 Complete product data, Drawings, descriptions of materials and methods where applicable. Provide manufacturer's name and address, trade name, and model number of product (if applicable), and name of fabricator or supplier (if applicable).
  - .2 Samples where applicable or requested.
  - .3 Detailed comparison of significant qualities (size, weight, durability, performance and similar characteristics, and including visual effect where applicable) for proposed substitution in comparison with original requirements.
  - .4 List, with addresses, of three (3) projects where proposed substitution has been used previously and successfully in a similar application.
  - .5 Coordination information indicating every required change in every other element of the Work which is affected by substitution, extended to include Work by Owner and separate Contractor(s).
  - .6 A complete statement of effect substitution will have upon schedule of the Work, including its effect (if any) on Contract Time (in comparison with compliance with requirements without approval of proposed substitution).
  - .7 Cost information, including a proposal of net change in Contract Sum (if any).

- .8 Certification by Contractor to the effect that, in their opinion and after their thorough evaluation, proposed substitution will result in total Work which is equal to or better than the Work originally required by Bid Documents, in every respect of significance except as specifically stated in certification; and that it will perform adequately in application indicated, regardless of equality and exceptions thereto.
- .9 Include in certification, Contractor's waiver of rights to additional payment and time which may subsequently be necessitated, by failure of substitution to perform adequately and for required Work to make corrections thereof.
- 3.12.18 Approval of Substitutions:
  - .1 Requests for substitutions, for a requested approved equal product, will be reviewed for compliance with the Specifications based upon the data provided by the Contractor after the award of the project. Approval or rejection will be based on samples, technical data and other items submitted and will be reviewed once and only once for each such request.
  - .2 Change Order Form: Submit requests for substitution(s) which propose a change in either the Contract Sum or Contract Time by procedures required for change order proposals.
- 3.12.19 "Or Equals"
  - A. Contractor's Request; Governing Criteria: Whenever an item of equipment or material is specified to described in the Bid Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The Specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the Specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that the Architect authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
  - B. If the Architect, in its sole discretion, determines that an item of equipment or material proposed by the Contractor is functionally equal to that names and sufficiently similar so that no change in related Work will be required, the Architect will deem in an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
  - C. In the exercise of reasonable judgment, Architect determines that the proposed item:

- 1. Is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
- 2. Will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
- 3. Has a proven record of performance and availability of responsive service; and
- 4. Is not objectionable to the Owner.
- D. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
  - 1. There will be no increase in cost to the Owner or increase in Contract Times; and
  - 2. The item will conform substantially to the detailed requirements of the item named in the Bid Documents.
- E. Contractor's Expense: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- F. Architect's Evaluation and Determination: Architect will be allowed a reasonable time to evaluate each "or equal" request. Architect may require Contractor to furnish additional data about the proposed "or equal" item. Architect will be the sole judge of acceptability. No "or equal" item will be ordered, furnished, installed or utilized until Architect's review is complete and Architect determines that the proposed item is an "or equal," which will be evidence by an approved Shop Drawing or other written communication. Architect will advise Contractor in writing of any negative determination.
- G. Effect of Architect's Determination: Neither approval nor denial of an "or equal" request will result in any change in Contract Price. The Architect's denial of an "or equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- H. Treatment as a Substitution Request: If Architect determines that an item of equipment or material proposed by Contractor does not qualify as an "or equal" item, Contractor may request that the Architect consider the item a proposed substitute pursuant to 3.12.17.

# 1.4 ARTICLE 9 PAYMENTS AND COMPLETION

A. Supplement Paragraph 9.2 "SCHEDULE OF VALUES" as follows:

9.2.2 Immediately after Award of Contract, the Contractor shall prepare and submit a Schedule of Values, breaking down all Work by type and Trade. Each scheduled value line item shall be for material and labor for each entity of Work.

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9.2.3 Project soft costs including, but not limited to, bond, insurance, mobilization, supervision, submittals, punch-list, training, as-built drawings and close-out documents, shall be indicated in separate line items.

9.2.4. Project Allowances: Include all project allowance(s) at the end of the Schedule of Values to allow subsequent draw-down when authorized in writing by the Architect.

9.2.5 When an advertisement for bid has included multiple buildings in a single project, the Contractor shall submit separate Schedule of Values for each building.

9.2.6 Unless printed invoices are provided by the Contractor from Insurance and Bonding Companies for which payment is being requested, a maximum of one and one half (1-1/2%) of the total cost of the awarded Contract Amount will be allowed.

# B. Supplement Paragraph 9.6 "PROGRESS PAYMENTS", as follows:

9.6.9 Any Contract entered into by a board of education pursuant to section 1 of P.L.1987, c.343 (C.18A:18A-40.1) for which the Contractor shall agree to the withholding of payments pursuant to section 2 of P.L.1987, c.343 (C.18A:18A-40.2), 5% of the amount due on each partial payment shall be withheld by the board of education pending completion of the Contract if the Contractor does not have a performance bond. If the Contractor does have a performance bond, 2% of the amount due on each partial payment shall be withheld by the outstanding balance of the Contract exceeds \$500,000, and 5% of the amount due on each partial payment shall be withheld by the board of education when the outstanding balance of the Contract exceeds \$500,000, and 5% of the amount due on each partial payment shall be withheld by the board of education when the outstanding balance of the Contract is \$500,000 or less.

9.6.10 Final payment will be made provided the Work has been completed, the Contract fully performed and a final certificate for payment has been issued by the Architect.

9.6.11 Pursuant to <u>N.J.S.A</u> 2A:30A-1, "If a Prime Contractor has performed in accordance with the provisions of a Contract with the Owner and the billing for the Work has been approved and certified by the Owner or the Owner's authorized approving agent, the Owner shall pay the amount due to the Prime Contractor for each periodic payment, final payment or retainage monies not more than 30 calendar days after the billing date, which for a periodic billing, shall be the periodic billing date specified in the Contract[,] ... except that in the case of a public or governmental entity that requires the entity's governing body to vote on authorizations for each periodic payment, final payment or retainage monies, the amount due may be approved and certified at the next scheduled public meeting of the entity's governing body, and paid during the entity's subsequent payment cycle, provided this exception has been defined in the bid Specifications and Bid Documents."

9.6.12 The Architect shall review applications and certifications for payment submitted by the Contractor which have been signed and certified as required by the Bid Documents. By submitting an application and certification for payment, the Contractor

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is representing that it has verified that all Work for which payment is being requested, has been completed in accordance with all the requirements of the Bid Documents.

9.6.13 The Architect's approval of the Contractor's certification for payment shall constitute a representation to the Owner, based on the Architect's evaluation of the Contractor's Work and on the data comprising the Contractor's Application for Payment, that, to the best of the Architect's knowledge, information and belief, and, based on periodic on-site observations, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Bid Documents. The Architect is not responsible to provide continuous observation of the Work.

# 1.5 ARTICLE 11 INSURANCE AND BONDS

A. Supplement Paragraph 11.1 "Contractor's Insurance and Bonds", as follows:

11.1.5 Contractor's liability insurance must be maintained until the final Certificate of Payment is issued pursuant to Paragraph 9.10.1 and Completed Operations Insurance is in effect.

11.1.6 Insurance specified to be provided by the Contractor under Paragraph 11.1 shall be on an occurrence basis, as follows and as noted in AIA A101 - 2017, Exhibit A:

- .1 The Contractor shall take out and maintain during the life of this Contract commercial general liability insurance, covering any and all bodily injury, including accidental death, as well as claims for property damage arising out of or in connection with the Work performed hereunder, whether such Work be performed by the Contractor or by any Subcontractor or by anyone directly or indirectly employed by either of them.
  - .1 The policy shall name the Owner, the Architect, and their consultants and agents and employees as additional insureds.
- .2 The Contractor shall take out and maintain comprehensive automobile liability insurance, including coverage for all owned, non-owned and hired vehicles, covering bodily injury and property damage.
  - .1 The policy shall name the Owner, the Architect, and their consultants and agents and employees as additional insureds.
- .3 Contractual liability insurance as applicable to the Contractor's obligations under Paragraph 3.18 of the AIA General Conditions.
- .4 Completed Operations Insurance written to the limits specified for liability insurance specified AIA A101 2017, Exhibit A, Article A.3 Contractor's Insurance and Bonds. Coverage shall be maintained for five (5) years from the date of the start of Beneficial Occupancy until after final payment or the then current applicable statue of repose.
- .5 Certificates of insurance must be submitted on the ACORD Form, Certificate of Insurance.
- .6 The Contractor shall either:
  - .1 require each of their Subcontractors to procure and to maintain during the life of their Subcontracts, Subcontractor's Public Liability and Property Damage, of the type and in the same amounts as specified in the preceding

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paragraph; **or** 

.2 insure the activities of their Subcontractors under their respective policies.

# B. Paragraph 11.3 WAIVERS OF SUBROGATION

Delete Paragraph 11.3.2 in its entirety.

# **END OF SECTION 00800**

# SECTION 00850 - CONTRACT DRAWINGS

1.1 All Drawings listed on Drawing No. G001, "Title Sheet," dated November 1, 2024, unless otherwise revised or amended (via Addenda, Bulletin, etc.), shall form a part of the Bid Documents.

# END OF SECTION 00850

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### 1:00850-1

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## SECTION 00860 - LAWS GOVERNING PUBLIC WORK

## PART 1 - GENERAL

## 1.1 GENERAL REQUIREMENTS

A. The paragraphs below supplement the General Conditions. Attention is called, but not limited, to the following Laws Governing Public Work.

# 1.2 FEDERALLY FUNDED CONSTRUCTION ACTIVITIES REQUIREMENTS - UPK FACILITIES

- A. Refer to Appendix I (following this specification section) for additional requirements.
- B. The State Fiscal Year 2023 New Jersey budget appropriates \$120 million from the American Rescue Plan, State Fiscal Recovery Funds to support preschool facilities construction projects (UPK Facilities).
- C. The Local Educational Agency (LEA) must continue to follow State of New Jersey Public School Contracts Law found at <u>N.J.S.A.</u> 18A:18A. Additionally, all Regulations at <u>N.J.A.C.</u> 6A:26, Educational Facilities must also be followed.
  - 1. <u>NOTE</u>: The regulations listed in Appendix I are provided for reference, but New Jersey State law is often more restrictive. The more restrictive procurement rules must be followed and applied to procurement(s). The Local Educational Agency (LEA) should consult their board attorney if they are unsure of which regulation(s) applies.

# 1.3 STATE SALES AND USE TAX EXEMPTION

A. Supplement AIA A201, paragraph 3.6 "Taxes" as follows:

3.6.1 As a New Jersey governmental entity, the Board of Education is exempt from the requirements under New Jersey state sales and use tax (<u>N.J.S.A.</u> 54:32B-1 et seq.), and does not pay any sales or use taxes. Bidders should note that they are expected to comply with the provisions of said statute and the rules and regulations promulgated thereto to qualify them for examinations and reference to any and all labor, services, materials and supplies furnished to the Board of Education. Contractors may not use the Board's tax identification number to purchase supplies, materials, service or equipment, for this project.

.1 A Contractor may qualify for a New Jersey Sales Tax Exemption on the purchase of materials, supplies and services when these purchases are used exclusively to fulfill the terms and conditions of the contract with the Board of Education. All Contractors are referred to New Jersey Division of Taxation-Tax Bulletin S&U-3 and in particular, Contractor's Exempt Purchase Certificate (Form ST-13). Again, Contractors are not permitted to use the Board's tax identification number to purchase supplies, materials, services of equipment.

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## 1.4 MUNICIPAL REQUIREMENTS

A. Supplement paragraph 3.7 "Permits, Fees, Notices and Compliance with Laws" as follows:

3.7.1.1 <u>N.J.S.A.</u> 52:27D-130, provides that local Municipal Construction Enforcing Agency issue required construction permit, perform required inspections during construction, and issue required certificate of occupancy upon completion of Project.

3.7.1.2 <u>N.J.S.A.</u> 52:27D-126C, "No county, municipality, or any agency or instrumentality thereof shall be required to pay any municipal fee or charge in order to secure a construction permit for the erection or alteration of any public building or part thereof from the municipality wherein the building may be located. No erection or alteration of any public building or part thereof by a county, municipality, school board, or any agency or instrumentality thereof shall be subject to any fee, including any surcharge or training fee, imposed by any department or agency of State government pursuant to any law, or rule or regulation, except that nothing contained in this section shall be interpreted as preventing the imposition of a fee upon a board of education by either the Department of Education for plan review or by a municipality for the review of plans submitted to it pursuant to the provisions of section 12 of P.L.1975, c.217 (C.52:27D-130).

3.7.1.3 <u>N.J.S.A.</u> 40:55D-8(d), A municipality shall exempt a board of education from the payment of any fee related to the <u>Municipal Land Use Law</u>.

3.7.1.4 <u>N.J.S.A.</u> § 52:27d-126e (amended effective July 21, 2017) Waiver of construction permit surcharge or enforcing agency fee for construction, alteration, etc. to promote accessibility by persons with disabilities to existing public or private structures or facilities, or to promote accessibility by veterans with disabilities to their living units.

1."a. Notwithstanding the provisions of the "State Uniform Construction Code Act," P.L. 1975, c.217 (C.52:27D-1 19 et seq.), or any rules, regulations or standards adopted pursuant thereto, to the contrary, the governing body of any municipality which has appointed an enforcing agency pursuant to the provisions of section 8 of P.L.1975, c.217 (C.52:27D-126) may, by ordinance, provide that no person shall be charged a construction permit surcharge fee or enforcing agency fee for any construction, reconstruction, alteration or improvement designed and undertaken solely to promote accessibility by disabled persons to an existing public or private structure or any of the facilities contained therein.

The ordinance may further provide that a disabled person, or a parent or sibling of a disabled person, shall not be required to pay any municipal fee or charge in order to secure a construction permit for any construction, reconstruction, alteration or improvement which promotes accessibility to his own living unit.

For the purposes of this subsection, "disabled person" means a person who has the total and permanent inability to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment, including blindness, and shall include, but not be limited to, any resident of this State who is disabled pursuant to the federal Social Security Act (42 U.S.C.416), or the federal Railroad Retirement Act of 1974 (45 U.S.C.231 et seq.), or is rated as having a 60% disability or higher pursuant to any federal law administered by the United States Veterans' Act. For purposes of this paragraph "blindness" means central visual acuity of 20/200 or less in the better eye with the use of a correcting lens. An eye which is accompanied by a limitation in the fields of vision such that the widest diameter of the visual field subtends an angle no greater than 20 degrees shall be considered as having a central visual acuity of 20/200 or less.

b. (1) Notwithstanding the provisions of the "State Uniform Construction Code Act," P.L. 1975, c.217 (C.52:27D-119 et seq.) or any rules, regulations or standards adopted pursuant thereto to the contrary, the governing body of any municipality which has appointed an enforcing agency pursuant to the provisions of section 8 of P.L. 1975, c.217 (C.52:27D-126) shall not charge a person who has a service-connected disability declared by the United States Department of Veterans Affairs, or its successor, to be a total or 100% permanent disability that would entitle them to a property tax exemption under section 1 of P.L.1948, c.259 (C.54:4-3.30) or a spouse, parent sibling, or guardian of the disabled veteran, a construction permit surcharge fee or enforcing agency fee for any construction, reconstruction, alteration, or improvement designed and undertaken solely to promote accessibility by the disabled veteran to his own living unit.

(2) A municipality that has granted an exemption from a construction permit surcharge fee or enforcing agency fee pursuant to paragraph (1) of this subsection may apply to the Department of Community Affairs, in accordance with rules and regulations promulgated by the Commissioner of Community Affairs for this purpose, for reimbursement of those exempt fees.

- B. Utility Connection Fees: Contractors shall pay utility connection fees and shall be reimbursed by Owner upon presentation of receipt for same.
- C. Certificates of Occupancy: Contractors shall be responsible for obtaining all Certificates of Occupancy.

# 1.5 TIME INCLUDING COMPLETION

A. Supplement Article 8 "Time" as follows:

8.1.7 The term "completed" in <u>N.J.S.A.</u> 18A:18A-19 shall mean substantial completion as defined in this Article 8.

8.1.8 The term "Working Days" as used to compute the time of completion shall mean Mondays through Fridays, exclusive of the thirteen major yearly holidays, as

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listed on the official State of New Jersey website, https://www.state.nj.us/nj/about/facts/holidays/

B. Supplement Article 8.3 "Delays and Extension of Time" as follows:

8.3.5 The Contractor agrees that the Owner can deduct from the Contract Price, any wages paid by the Owner to any Inspector or Inspectors necessarily employed by the Owner for any number of days in excess of the number of days allowed in the specifications for completion of the work.

C. Refer to attached Appendix I (E): Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-2708).

## 1.6 NONDISCRIMINATION AND MISCELLANEOUS LABOR PROVISIONS

A. Attention is called to the following which supplement paragraph 13.1 "Antidiscrimination Provisions" as follows:

13.1.2 <u>N.J.S.A.</u> 10:2-1, Antidiscrimination provisions. Every contract for or on behalf of the State or any county or municipality or other political subdivision of the State, or any agency of or authority created by any of the foregoing, for the construction, alteration or repair of any public building or public work or for the acquisition of materials, equipment, supplies or services shall contain provisions by which the Contractor agrees that:

a. In the hiring of persons for the performance of work under this contract or any subcontract hereunder, or for the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under this Contract, no Contractor, nor any person acting on behalf of such Contractor or Subcontractor, shall, by reason of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex, discriminate against any person who is qualified and available to perform the work to which the employment relates;

b. No Contractor, Subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee engaged in the performance of work under this Contract or any Subcontract hereunder, or engaged in the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under such Contract, on account of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex;

c. There may be deducted from the amount payable to the Contractor by the contracting public agency, under this Contract, a penalty of \$50.00 for each person for each calendar day during which such person is discriminated against or intimidated in violation of the provisions of the Contract; and

d. This Contract may be canceled or terminated by the contracting public agency, and all money due or to become due hereunder may be forfeited, for any violation of this section of the Contract occurring after notice to the Contractor from the contracting public agency of any prior violation of this section of the Contract.

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No provision in this section shall be construed to prevent a board of education from designating that a Contract, subcontract or other means of procurement of goods, services, equipment or construction shall be awarded to a small business enterprise, minority business enterprise or a women's business enterprise pursuant to <u>N.J.S.A.</u> 18A:18A-51 et seq.

During the performance of this Contract, the Contractor agrees to Mandatory Equal Employment Opportunity Language, as shown Exhibit B.

13.1.3 <u>N.J.S.A.</u> 34:11-56.25 et seq., in accordance with which the Contractor(s) and Subcontractor(s) are required to do the following:

- .1 Pay to all workers engaged in the performance of services directly upon the work not less than the prevailing rate of wages. In the event that it is found that any worker employed by the Contractor(s) or any Subcontractor(s) has been paid a rate of wage less than the prevailing wage required to be paid by such Contract, the Owner may terminate the Contractor's right to proceed with the work or such part of the work as to which there has been a failure to pay required wages and to prosecute the work to completion or otherwise.
  - .1 Prime Contractor(s) shall post the New Jersey Department of Labor and Workforce Development Prevailing Wage Rate Determination in accordance with N.J.S.A. 34:11-56.25 et seq., which establish and enforce a prevailing wage level for workers engaged in the project, based on the effective date where the Contract(s) is/are to be awarded. This document is to be posted in a prominent and easily accessible place at the site of the work and at such a place or places as are used to pay workers their wages. The prevailing wage rates shall be incorporated into the bid Specification manual as a reference and part of the Contract. A copy of the project's prevailing wage rates, as applicable to this Project, are on file at the Architect's office.
- .2 Before final payment, furnish Owner with an Affidavit stating that all workers have been paid in accordance with the New Jersey Prevailing Wage Act.
- .3 Keep an accurate record showing the name, craft or trade and actual hourly rate of wages paid to each workman employed by them in connection with their work. Preserve records for 2 years from date of payment.
- .4 Upon request, the Contractor(s) and each Subcontractor shall file written statements certifying to the amounts then due and owing to any and all workers for wages due on account of the work. The statement shall set forth the names of the persons whose wages are unpaid and the amount due to each. These statements shall be verified by the oaths of the Contractor(s) or Subcontractor(s), as the case may be.
- B. Refer to attached Appendix I (C): Equal Employment Opportunity.

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# 1.7 AMERICANS WITH DISABILITIES ACT; FACILITIES FOR PERSONS WITH DISABILITIES

- A. The Contractor must comply with all provisions of Title II of the Americans with Disabilities Act (ADA), P.L. 101-336, in accordance with 42 U.S.C. S121.01 et seq. The Board of Education further recognizes that all Specifications for the construction, remodeling or renovation of any public building shall provide facilities for persons with disabilities. Reference: N.J.S.A. 18A:18A-17.
- B. It is further recommended that Bidders are required to read the Americans with Disabilities language form that is included in these Specifications. The form shall be signed to show agreement with the provisions of Title II of the Act and the provisions are to be made a part of the Contract. The signed form shall be submitted with the bid proposal. The Contractor is obligated to comply with the Act and to hold the Owner harmless.

# 1.8 AMERICAN GOODS AND PRODUCTS

A. Supplement Paragraph 13.1 "Governing Law" as follows:

13.1.2 <u>N.J.S.A.</u> 18A:18A-20 et seq., American goods and products to be used where possible. "Each board of education shall provide as a condition of the Contract that only manufactured and farm products of the United States, where ever available, be used in the work."

B. Refer to attached Appendix I (L): Domestic Preference for Procurements 2 CFR 200.322 and (M): Build America, Buy America Act (Public law No. 117-58).

# 1.9 PAYMENTS TO LISTED SUBCONTRACTORS UNDER SINGLE OVERALL CONTRACT

A. Supplement Paragraph 13.1 "Governing Law" as follows:

13.1.6 <u>N.J.S.A.</u> 18A:18A-18, providing that under a single overall Contract, all payment required to be made for work and materials supplied by the various Subcontractors shall, upon certification by the Prime Contractor of the amount due to the Subcontractor(s), be paid directly to the Subcontractor(s).

# 1.10 DISCLOSURE OF CONTRIBUTIONS TO NEW JERSEY ELECTION LAW ENFORCEMENT COMMISSION (ELEC)

A. <u>N.J.S.A.</u> 19:44A-20.27 establishes a new disclosure requirement for business entities. It requires that, when a business entity has received in any calendar year \$50,000 or more in Public Contracts with public entities, it must file an annual report with the Election Law Enforcement Commission (ELEC). The report shall disclose any contribution of money or any other thing of value, including an in-kind contribution, or pledge to make a contribution of any kind:

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- 1. To a candidate for or the holder of any public office having ultimate responsibility for the awarding of Public Contracts, or,
- 2. To a political party committee, legislative leadership committee, political committee or continuing political committee.
- B. The report will include all reportable contributions made by the business entity during the 12 months prior to the reporting deadline. ELEC will be promulgating a form and procedures for filing commencing in January 2007. ELEC can also impose fines for failure to comply with this requirement.
- C. While the local unit has no role in this process, it is recommended that all bid or proposal Specifications and Contracts should include language notifying business entities of their potential obligation under the law. Such language could read as follows:
  - Starting in January 2007, all business entities are advised of their responsibility to file an annual disclosure statement of political contributions with the New Jersey Election Law Enforcement Commission (ELEC) pursuant to <u>N.J.S.A.</u> 19:44A-20.27 if they receive Contracts in excess of \$50,000 from public entities in a calendar year. Business entities are responsible for determining if filing is necessary. Additional information on this requirement is available from ELEC at Tel. #888-313-3532 or at www.elec.state.nj.us."

# 1.11 PROMPT PAYMENT ACT

A. The Owner will issue timely payments to Contractors in accordance with the requirements of the Prompt Payment Act, <u>N.J.S.A.</u> 2A:30A-1, et seq. The Bidders are hereby notified that the Owner as a public entity requires all payments to be approved at scheduled public board meetings. The vote on authorization for payments will be made at the first public meeting of the Board following the Board's receipt of the Architect's authorization for payment and paid during the subsequent payment cycle.

# 1.12 EQUAL EMPLOYMENT OPPORTUNITIES AND AFFIRMATIVE ACTION

- A. Bidders are required to comply with the requirements of <u>N.J.S.A.</u> 10:5-31 et seq. <u>and</u> <u>N.J.A.C.</u> 17:27 et. seq.
  - 1. Each Contractor shall submit to the public agency, after notification of award but prior to execution of a goods and services contract, one of the following three documents:
    - a. "A photocopy of a valid letter that the Contractor is operating under an existing Federally approved or sanctioned affirmative action program; or
    - b. "A photocopy of a Certificate of Employee Information Report approval, issued in accordance with <u>N.J.A.C.</u> 17:27-4"; or
    - c. "A photocopy of an Employee Information Report (Form AA302) provided by the Division and distributed to the public agency to be completed by the Contractor.

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- B. Initial Project Workforce Report Construction (AA201)
  - 1. In accordance with the requirements of the New Jersey Department of Labor & Workforce Development Construction EEO Compliance Monitoring Unit, the Initial Project Workforce Report-Construction (AA201) document, must be submitted to the Public Agency that awards the contract and the Department of Labor & Workforce Development Construction EEO Compliance Monitoring Program after notification of award, but prior to signing the contract.

https://www.nj.gov/treasury/contract\_compliance/documents/pdf/guidelines/pa.pdf

C. Refer to attached Appendix I (C): Equal Employment Opportunity.

# 1.13 OFFICE OF THE STATE COMPTROLLER

- A. N.J.A.C. 17:44-2.2: Authority to Audit or Review Contract Records
  - 1. Relevant records of private vendors or other persons entering into Contracts with covered entities are subject to audit or review by the Office of the State Comptroller (OSC) pursuant to <u>N.J.S.A.</u> 52:15C-14(d).
    - a. (The Contract partner) shall maintain all documentation related to products, transactions or services under this Contract for a period of **five (5) years** from the date of final payment. Such records shall be made available to the New Jersey Office of the State Comptroller upon request.
- B. Contractor/Vendor Requirements-Office of the New Jersey State Comptroller
  - 1. Contractors/vendors doing business with the board of education are reminded of the following legal requirements pertaining to the Office of the New Jersey State Comptroller:
    - a. Access to Relevant Documents and Information <u>N.J.S.A.</u> 52:15C-14 (d)
      - Private vendors or other persons contracting with or receiving funds 1) from a unit in the Executive branch of State government, including an entity exercising executive branch authority, independent State authority, public institution of higher education, or unit of local government or board of education shall upon request by the State Comptroller provide the State Comptroller with prompt access to all relevant documents and information as a condition of the Contract and receipt of public monies. The State Comptroller shall not disclose any document or information to which access is provided that is confidential or proprietary. If the State Comptroller finds that any person receiving funds from a unit in the Executive branch of State government, including an entity exercising executive branch authority, independent State authority, public institution of higher education, or unit of local government or board of education refuses to provide information upon the request of the State Comptroller, or otherwise impedes or fails to cooperate with any audit or performance review,

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the State Comptroller may recommend to the contracting unit that the person be subject to termination of their Contract, or temporarily or permanently debarred from contracting with the contracting unit.

- b. Maintenance of Contract Records N.J.A.C. 17:44-2.2
  - 1) Relevant records of private vendors or other persons entering into Contracts with covered entities are subject to audit or review by OSC pursuant to N.J.S.A. 52:15C-14(d).
  - 2) The Contractor/vendor to whom a Contract has been awarded, shall maintain all documentation related to products, transactions or services under this Contract for a period of five years from the date of final payment. Such records shall be made available to the New Jersey Office of the State Comptroller upon request.

# 1.14 ANTI-BULLYING BILL OF RIGHTS ACT

- A. <u>N.J.S.A.</u> 18A:37-16 provides:
  - 1. A member of a board of education, school employee, student or volunteer shall not engage in reprisal, retaliation or false accusation against a victim, witness or one with reliable information about an act of harassment, intimidation or bullying.
  - 2. A member of a board of education, school employee, contracted service provider, student or volunteer who has witnessed, or has reliable information that a student has been subject to, harassment, intimidation or bullying shall report the incident to the appropriate school official designated by the school district's policy, or to any school administrator or safe schools resource officer, who shall immediately initiate the school district's procedures concerning school bullying.
  - 3. A member of a board of education or a school employee who promptly reports an incident of harassment, intimidation or bullying, to the appropriate school official designated by the school district's policy, or to any school administrator or safe schools resource officer, and who makes this report in compliance with the procedures in the district's policy, is immune from a cause of action for damages arising from any failure to remedy the reported incident.
  - 4. A school administrator who receives a report of harassment, intimidation, or bullying from a district employee, and fails to initiate or conduct an investigation, or who should have known of an incident of harassment, intimidation, or bullying and fails to take sufficient action to minimize or eliminate the harassment, intimidation, or bullying, may be subject to disciplinary action.

# 1.15 CONTROLLING SILICA EXPOSURES IN CONSTRUCTION

- A. Occupational Safety and Health Administration (OSHA) U.S. Department of Labor: OSHA 29 CFR 1926.1153, 2017.
  - 1. The above referenced guidance advisory document is not a standard or regulation, and it creates no new legal obligations. The document is advisory in

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nature, informational in content, and is intended to assist employers in providing a safe and healthful workplace. The Occupational Safety and Health Act requires employers to comply with safety and health standards promulgated by OSHA or by a state with an OSHA approved state plan. In addition, pursuant to Section 5(a)(1), the General Duty Clause of the Act, employers must provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm. Employers can be cited for violating the General Duty Clause if there is a recognized hazard and they do not take reasonable steps to prevent or abate the hazard. However, failure to implement any specific recommendations contained within this document is not, in itself, a violation of the General Duty Clause. Citations can only be based on standards, regulations, and the General Duty Clause.

- a. This guidance document addresses the control of employee exposures to respirable dust containing crystalline silica, which is known to cause silicosis, a serious lung disease, as well as increase the risk of lung cancer and other systemic diseases.
- b. This document provides information on the effectiveness of various engineering control approaches for several kinds of construction operations and equipment, and contains recommendations for work practices and respiratory protection, as appropriate.
- c. OSHA encourages employers to conduct periodic exposure monitoring to confirm that engineering and work practice controls are effective and that appropriate respiratory protection is being used where necessary.
- 2. The above referenced advisory document can be found at: https://www.osha.gov/dsg/topics/silicacrystalline/construction\_info\_silica.html

# 1.16 CERTIFICATION OF NON-DEBARMENT FOR FEDERAL GOVERNMENT CONTRACTS

- A. Pursuant to <u>N.J.S.A.</u> 52:32-44.1, any natural person, company, firm, association, corporation, or other entity prohibited, or "debarred," from contracting with the federal government agencies, shall also be prohibited from contracting for public work in the state of New Jersey. This prohibition also extends to any affiliate organization(s) held by or subject to the control of an entity of that prohibited person or entity.
- B. Prior to awarding a Contract for public work, a local units must obtain written certification from the contracting person or entity through the form (Certification of Non-Debarment for Federal Government Contracts, <u>N.J.S.A.</u> 52:32-44.1 (P.L. 2019, c406), attesting to their non-debarment from contracting with federal government agencies.

# 1.17 CONTRACTOR EMPLOYEES PROCEDURE FOR CRIMINAL HISTORY RECORD CHECKS

A. The Office of Student Protection (OSP) suggests the following recommendation when educational facilities submit Contractor employees (i.e., masons, building and roofing

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companies) for short-term and long-term projects. The school official, acting as a liaison to the construction Contractor, must share with other school district administrators the names of the company's employees who will be submitting to a criminal record check. This process will assure that employees of the Contractor who have not obtained their approval for employment and are disqualified or ineligible for school employment will be identified as a Contractor service provider employee and not continue to be employed at school facilities and have direct contact with the student population.

- 1. To ensure compliance with the requirements of <u>N.J.S.A.</u> 18A:6-7.2, the Chief School Administrator shall direct the school official acting as a liaison to the construction company to obtain a list of individuals who will be employed by the Contractor for the school facility project that will be undergoing a criminal history record check. The liaison shall then provide a copy of this list to the Superintendent's Office and Human Resource Director, as these offices will receive any adverse action correspondence from the OSP related to the criminal history record check process.
- 2. Upon receipt of disqualification or ineligibility correspondence, the Superintendent's Office or Human Resource personnel shall review the contracted company list in order to determine if the subject of that letter is either a school employee or an employee of any contract service provider and take the appropriate action.
- 3. As with any school employee, **no employee of a Contract service provider** shall commence work at a school facility without having first obtained an approval for employment from the Office of Student Protection.
- 4. Approvals for employment for these type contracted employees shall be maintained with the liaison and copies forwarded to the Superintendent's Office.

# 1.18 LABOR-REGISTERED APPRENTICESHIP PROGRAM

- A. As of May 1, 2019, <u>N.J.S.A.</u> 34:11-56.50 requires Contractors that directly employ craftworkers to participate in a United States Department of Labor-registered apprenticeship program as a condition of initial or renewed PWCR registration. Contracting units are not responsible for verifying Contractor participation in a registered apprenticeship program.
- B. A Contractor working on a Public Works Project who directly employs craft workers, must certify to the NJDOL that they participate in a registered Apprenticeship Program for each craft they employ as defined in <u>N.J.S.A.</u> 34:11-56 and CFR, et al.
- C. "Registered apprenticeship program" means an apprenticeship program which is registered with and approved by the USDOL, which provides each trainee with combined classroom and on-the-job training in an occupation recognized as an apprenticeable occupation, and which meets the program standards of enrollment and graduation under 29 C.F.R. §29.6. N.J.S.A. 34:11-56.50.

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### 1.19 NEW JERSEY PREVAILING WAGE ACT

- A. An Act concerning certain contracts for public work and amending and supplementing <u>N.J.S.A.</u> 34:11-56.27
  - 1. <u>N.J.S.A</u>. 34:11-56.27a. Payment of prevailing wage rates; certification required of certain bidders; rules and regulations.

a) a. If a person makes the lowest bid for a Contract with a public body for public work subject to the provisions of the "New Jersey Prevailing Wage Act," P.L.1963, c.150 (C.34:11-56.25 et. seq.) and that bid is ten percent or more lower than the next lowest bid for the Contract, the person making the lowest bid shall certify to the public body that the prevailing wage rates required by that act shall be paid. If the Bidder does not provide the certification prior to award of the Contract, the public body shall award the Contract to the next lowest responsible and responsive Bidder. This certification shall be required only when a public body is engaging in competitive bidding for public work.

b. The Commissioner of Labor and Workforce Development, in consultation with the Division of Local Government Services in the Department of Community Affairs, shall promulgate rules and regulations concerning the standardization of the certification necessary to effectuate the provisions of this section.

b) <u>N.J.S.A.</u> 34:11-56.27. Required contract provisions; liability of Contractor and Sureties for excess costs; rules and regulations.

Every Contract in excess of the prevailing wage Contract threshold a. amount for any public work to which any public body is a party or for public work to be done on property or premises owned by a public body or leased or to be leased by a public body shall contain a provision stating the prevailing wage rate which can be paid (as shall be designated by the commissioner) to the workers employed in the performance of the Contract and the Contract shall contain a stipulation that such workers shall be paid not less than such prevailing wage rate. Such Contract shall also contain a provision that in the event it is found that any worker, employed by the Contractor or any Subcontractor covered by said Contract, has been paid a rate of wages less than the prevailing wage required to be paid by such Contract, the public body, the lessee to whom the public body is leasing a property or premises or the lessor from whom the public body is leasing or will be leasing a property or premises may terminate the Contractor's or Subcontractor's right to proceed with the work, or such part of the work as to which there has been a failure to pay required wages and to prosecute the work to completion or otherwise. The Contractor and their Sureties shall be liable for any excess costs occasioned thereby to the public body, any lessee to whom the public body is leasing a property or premises or any lessor from whom the public body is leasing or will be leasing a property or premises.

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b. The Commissioner of Labor and Workforce Development, in consultation with the Division of Local Government Services, shall promulgate rules and regulations concerning the standardization of the contractual language necessary to effectuate the provisions of this section.

- 2. Compliance with New Jersey Prevailing Wage Act (N.J.S.A. 34:11-56.25 et seq.)
  - a. Every Contractor and Subcontractor performing services in connection with this Project, shall pay all workers a wage rate not less than the published prevailing wage rates, for the locality the work is being performed, as designated by the New Jersey Department of Labor and Workforce Development (NJ DLWD).
  - b. Wage rates for the county of the location of the Public Agency (Owner), as published by the State Department of Labor and Workforce Development (DLWD), can be viewed at https://www.nj.gov/labor/wagehour/wagerate/prevailing\_wage\_determin ations.html.
  - c. The Contractor must complete and sign the "Prevailing Wage Certification" form included in the bid package and submit with their bid. This form confirms the Contractor's intention to comply with the Act. The Owner may terminate the Contract if Contractor fails to pay workers prevailing wage.
  - d. The prevailing wage rates in effect at the time of award, will be included by Owner as a part of the construction Contract.
- B. Refer to attached Appendix I (D): Davis-Bacon Act, as amended (40 U.S.C. 3141-3148).

# END OF SECTION 00860

## SECTION 00870 - MISCELLANEOUS REQUIREMENTS

# PART 1 - GENERAL

# 1.1 JOB SITE MEETINGS

- A. Regularly scheduled job meetings shall be held at a location and time convenient to the Owner's Representatives, the Architect and the Contractor. The Prime Contractor shall attend such meetings, or be represented by a person in authority who can speak for and/or make decisions for the Contractor.
- B. Attendance by the Contractor is mandatory, whether the meetings are weekly, bi-weekly or at whatever interval is determined by the Architect.
  - 1. Unless given prior approval by the Architect, the Prime Contractor will be fined \$250.00 for each regularly scheduled meeting for which they is not presented by a person the Contractor has advised the Architect has authority and who can speak for and/or make decisions for the Contractor. Fine amounts shall be withheld and deducted from the Contract Sum.

# 1.2 STRUCTURAL SAFETY STANDARDS AND CODES

- A. The standards, codes and design data referred to in the New Jersey "State Uniform Construction Code", apply to the work of the Contract, where applicable.
- B. Contractor shall comply with all applicable requirements of the Uniform Fire Safety Act, 52:27D-192 et seq.

# 1.3 OWNER'S RIGHT TO OCCUPY

- A. The Owner reserves the right to occupy any portion of the Project which is ready for occupancy prior to completion and acceptance of the Project, after Local Municipal Construction Enforcing Agency approval.
- B. The occupancy of any portion of the Project does not constitute an acceptance of any work nor does it waive the Owner's right to liquidated damages or constitute an acceptance of any work as the Project will be accepted as a whole and not in units. Prior to such occupancy, however, the Architect, a representative of the Owner, and the Contractor shall fully inspect the portions of the Project to be occupied, preparing a complete list of omissions of materials, faulty workmanship, or any items to be repaired, torn out or replaced. The Owner will assume responsibility for damage to premises so occupied of any items not on this list when such damage is due to greater than normal wear and tear, but does not assume responsibility for improper or defective workmanship or materials.

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# 1.4 OWNER'S GENERAL REQUIREMENTS

- A. The Owner requires that the Contractor demonstrate a safety and health program/plan, which includes, but is not limited to first aid, fire protection, housekeeping, illumination, sanitation, personal protective equipment, medical, exit, emergency action plans and all other issues required by government agencies having jurisdiction over the work of this project.
- B. The following Owner's General Requirements shall be enforced during construction and until final completion of the Work:
  - 1. No deliveries of construction materials or equipment is to take place during the arrival and departure of students from the respective schools. Verify and coordinate arrival and departure time with the Principal(s).
  - 2. All construction materials and equipment shall be stored behind the construction fence.
  - 3. No smoking on any of the School's Property.
  - 4. All workers must wear shirts at all time.
  - 5. Use of profanity will not be tolerated.
  - 6. The Prime Contractor shall provide identification cards for their Subcontractors, employees, etc.
  - 7. The Contractor shall comply with the requirements of all local ordinances including for noise.
  - 8. The Contractor and their Subcontractors <u>shall not</u> interact with students or staff, other than those identified by the Owner as a representative of the Owner.

# 1.5 ENVIRONMENTAL PROTECTION

- A. Conform to New Jersey Department of Environmental Protection Regulations <u>N.J.A.C.</u> 7:27, sub-chapters 5 and 7 and all other applicable standards.
- B. Conform to New Jersey Statute <u>N.J.S.A.</u> 26:2C-9.2 which requires that no person shall construct, install, alter or operate any equipment capable of causing the emission of air contaminants into the open air or control apparatus which prevents or controls the emission of air contaminants until an application has been filed with and approved by the Department of Environmental Protection.

# **1.6 CERTIFIED PAYROLLS**

A. Pursuant to N.J.A.C. 12:60-5.1(c)(1)(i), the Contractor shall furnish to the Owner

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certified payroll records each payroll period within ten (10) days of the payment of wages, indicating name, craft, social security number and actual hourly rate of wages paid to each worker employed on the project. A certified payroll record is defined as "a payroll record which is attested to by the employer, or a corporate officer of such company, or an authorized agent of the employer."

# 1.7 OPERATION AND MAINTENANCE

- A. Contractor shall furnish to the Owner all required operation and maintenance manuals for all included materials and equipment as well as assistance and training to the Owner's personnel for Contract's special systems and equipment in accordance with Bid Documents.
  - 1. Contractor shall submit electronic version of the MEP/FP O&M Manuals for review by the MEP/FP Consultant. Paper copies should not be submitted as part of the MEP/FP review process.

## END OF SECTION 00870

## **SECTION 01010 - SUMMARY OF WORK**

# PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

A. The Work of this Section applies to all Construction Bid Documents including Drawings, Division 1 - Miscellaneous Requirements Sections and Specifications Sections included in Part-2 through Part-6.

# 1.2 SUMMARY

- A. Section Includes:
  - 1. Project description.
  - 2. Contract scope description.
  - 3. Contractor's use of the premises.
  - 4. Preconstruction meeting.
  - 5. Security procedures.

# **1.3 PROJECT DESCRIPTION**

- A. The project consists of the Renovations for Five (5) Pre-K Classrooms at Clayton J. Davenport Elementary School for the Egg Harbor Township School District, Board of Education, Atlantic County, New Jersey.
- B. Bid Documents prepared by Fraytak Veisz Hopkins Duthie, P.C. Architects / Planners, (Project Number: FVHD-5481) and their Consulting Mechanical/Electrical Engineer: Gillan & Hartmann, Inc., Mont Clare, PA.

# 1.4 CONTRACT SCOPE DESCRIPTION

- A. The Work consists of but is not limited to the following:
  - 1. Renovations to existing buildings as follows:
    - a. Clayton J. Davenport ES:
      - 1) Renovations to two (2) rooms to create two Pre-Kindergarten Classrooms with self-contained toilet rooms. Room PK-1 will also have a Storage Closet.
      - 2) Renovations at Room PK-1 to provide two toilet rooms accessible from the hallway.
      - 3) Renovations to one area to create a Music Classroom.
      - 4) At the Primary School Building, renovations to an area to create three (3) Pre-Kindergarten Classrooms with self-contained toilet rooms.
      - 2) At the Primary School Building, renovations to provide Office #PK-P3B and Storage #PK-P1B which are accessible from the hallway.

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- 2. HVAC Work:
  - a. Removal of selected HVAC equipment including finned tube radiation, rooftop units, air handling units, ductwork, hydronic piping, unit ventilators and associated equipment.
  - b. New rooftop air handling units and associated piping, ductwork and accessories.
  - c. New unit ventilators and associated piping, ductwork and accessories.
  - d. New exhaust fans and associated ductwork and accessories.
  - e. Testing, balancing and adjusting.
  - f. Automatic temperature controls.
- 3. Plumbing and Fire Protection Work:
  - a. Removal of selected plumbing fixtures and associated domestic water piping.
  - b. Removal of sprinklers and associated piping.
  - c. New plumbing fixtures and associated piping and accessories.
  - d. New sprinklers and piping.
  - e. Hydraulic calculations.
- 4. Electrical Work:
  - a. Removal of lighting, associated wiring and controls.
  - b. Removal of fire alarm devices and associated wiring.
  - c. Removal of electrical devices and associated wiring.
  - d. Removal of power feeds for HVAC items scheduled to be removed.
  - e. Removal of data outlets and associated wiring In Elementary School,
  - f. Removal of data outlets, preservation of data wiring in Primary school.
  - g. Removal of PA and Clock equipment with associated wiring and back boxes.
  - h. New panels and associated feeders.
  - i. New fire alarm devices and associated wiring.
  - j. New electrical devices and associated wiring.
  - k. New data outlets and associated wiring in Elementary School.
  - I. New data outlets and reused or new data wiring in Primary School.
  - m. New lighting fixtures and digital lighting controls.
  - n. New power feeds for new mechanical items.
  - o. New power circuits for plumbing equipment (faucets)
  - p. Installation of new PA and Clock items, back boxes and associated wiring.
- 5. All indicated casework and equipment.
- 6. All other indicated work.
- B. Single Overall Contract: This Contract includes:
  - 1. All Work in accordance with Drawings, Parts 2, 4, 5 and 6 Specification Sections and in accordance with Bid Documents.
  - 2. General Construction Work includes:

- a. Work that is primarily architectural in nature plus work traditionally recognized as general construction in accordance with Drawings and as listed as a part of Part 2 Specification sections, unless otherwise indicated below:
  - 1) Also includes both administrative and coordination responsibilities.
    - a) General Construction Contractor is responsible for all coordination between their Work and Work of all Subcontractors.
  - 2) All initial excavation inside the building, and the preparation of the subbase under the concrete slab.
  - 3) All concrete Work in accordance with Part 2 Specification sections.
  - 4) Provide and install the metal fabrications in accordance with Division 2 Sections.
  - 5) Furnishing stainless steel sinks, fixtures, accessories, and all items supplied by the casework and equipment Subcontractor in accordance with Drawings and Specification sections in Division 11, for installation by the Plumbing Work Subcontractor.
  - 6) Furnishing all electrical devices and items supplied by the casework and equipment Subcontractor in accordance with Drawings and Specification sections in Division 11 for installation by the Electrical Work Subcontractor.
- 3. Plumbing, Drainage and Sprinkler System Work includes:
  - a. Piping servicing domestic water piping, drainage and sprinkler systems and connection of equipment tied into the above types of systems and including all work in accordance with Drawings and Part-4 Specification sections.
    - 1) Work shall include demolition and removals, as indicated or required, to allow for new construction.
    - 2) Work shall include reinstallation, cutting, patching, finishing and repair <u>Work associated with Plumbing, Drainage and Sprinkler System Work,</u> as indicated or required, including Work at existing roofs; cutting, alterations, replacement and flashing Work, where indicated or required.
      - a) Roofing Work shall be performed in accordance with requirements of existing roofing system's warranty and the Bid Documents.
  - b. Subsequent excavation, backfill and compaction of trenches after the Work of the General Construction Work, as required by the installation of plumbing utilities inside the building. Work shall be performed in accordance with requirements of Part-2 Specification sections.
- 4. Heating, Ventilating, Air Conditioning and Refrigeration Work includes:
  - a. Heating, ventilating, and air conditioning systems as well as the temperature control systems and including all Work in accordance with Drawings and Part-5 Specification sections.
    - 1) Work shall include demolition and removals, as indicated or required, to allow for new construction.
    - 2) Work shall include reinstallation, cutting, patching, finishing and repair <u>Work associated with HVACR</u> Work, as indicated or required, including performing Work at existing roof; cutting existing roof decking, provide

and install structural steel support, and all other roof flashing Work where indicated or required.

- a) Furnishing and installing all required structural framing and supports for roof top mechanical equipment at existing building whether shown or not.
- b) Structural framing shall be as per typical roof framing conditions as shown on the architectural and mechanical Drawings and/or as per approved shop drawings by the Architect.
- c) Roofing Work shall be performed in accordance with requirements of existing roofing system's warranty and the Bid Documents.
- 5. Electrical Work includes:
  - a. The Work necessary for electrical power distribution, lighting, and the connections to equipment tied into such systems, including all Work in accordance with Drawings and Part-6 Specification sections.
    - 1) Work shall include power distribution and wiring for all indicated electrically operated equipment and fixtures, (in Parts 2, 4, 5 and 6), whether shown or not on Drawings.
    - 2) Work shall include demolition and removals, as indicated or required, to allow for new construction.
    - 3) Work shall include reinstallation, cutting, patching, finishing and repair Work associate with Electrical Work, as indicated or required, including performing Work at existing roof; cutting existing roof decking, and all other roof flashing Work:
      - a) Roofing Work shall be performed in accordance with requirements of existing roofing system's warranty and the Bid Documents.
  - b. Subsequent excavation, backfill and compaction of trenches after the Work of the General Construction, above, as required by the installation of electrical utilities inside the building. Work shall be performed in accordance with requirements of Part-2 Specification sections.

# 1.5 WORK BY OTHERS

# A. OWNER-FURNISHED PRODUCTS

- 1. Where indicated or shown that Owner will furnish products, the Work of the Contract shall includes providing support systems to receive Owner's equipment, items and assemblies.
- 2. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
- 3. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
- 4. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.

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- 5. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
- 6. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
- 7. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
- 8. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
- 9. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.
- 10. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
- 11. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.

## 1.6 CONTRACTOR'S USE OF THE PREMISES

- A. The space available to the Contractor for the performance of the Work, either exclusively or in conjunction with others performing other construction as part of the project, is shown on the Drawings.
  - 1. Other areas are off limits to all construction personnel.
- B. The following building facilities may not be used by construction personnel:
  - 1. Toilet facilities.
  - 2. Food service facilities, including dining areas.
  - 3. Elevator.
- C. The Owner will partially occupy the buildings during the construction period.
  - 1. The Owner will endeavor to cooperate with the Contractor's operations when the Contractor has notified the Owner in advance of need for changes in operations in order to accommodate construction operations.
  - 2. Conduct the Work so as to cause the least interference with the Owner's operations.

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- D. Coordinate with Local Authorities as to which routes are capable of handling heavy truck traffic.
- E. Signs: Provide signs adequate to direct visitors.
  - 1. Do not install, or allow to be installed, signs other than specified sign(s) and signs identifying the principal entities involved in the project.
- F. All deliveries by the Contractor shall be coordinated with the Owner's Representative, prior to the delivery date.

# 1.7 **PRECONSTRUCTION MEETING**

- A. A preconstruction meeting will be held at a time and place designated by Fraytak Veisz Hopkins Duthie, P.C. Architects Planners for the purpose of identifying responsibilities of the Owner's / Architect's personnel and explanation of administrative procedures.
- B. The Contractor shall also use this meeting for the following minimum agenda:
  - 1. Construction schedule.
  - 2. Use of areas of the site.
  - 3. Delivery and storage.
  - 4. Safety.
  - 5. Security.
  - 6. Cleaning up.
  - 7. Subcontractor procedures relating to:
    - a. Submittals.
    - b. Change orders.
    - c. Applications for payment.
    - d. Record documents.
- C. Attendees shall include:
  - 1. The Owner / Owner's Representative.
  - 2. The Architect and any Consultants.
  - 3. The Prime Contractor and their superintendent(s).
  - 4. Major Subcontractors, suppliers and fabricators.
  - 5. Others interested in the Work.

## **1.8 SECURITY PROCEDURES**

- A. Limit access to the site and buildings to persons involved in the Work.
- B. Provide secure storage for materials for which the Owner has made payment and which are stored on-site.

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- C. Secure completed Work, as required to prevent loss.
- D. The Contractor, and their employees, will be required to be registered with the Owner's Representative / School's Main Office.
  - 1. The Contractor's personnel and Subcontractors will be required to wear identification badges at all times on each site.

## **END OF SECTION 01010**

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## SECTION 01020 - ALLOWANCES

## PART 1 - GENERAL

## 1.1 DESCRIPTION OF REQUIREMENTS

- A. Definitions and Explanations: Certain requirements of the Work related to each allowance are shown and specified in the Bid Documents. The allowance has been established in lieu of additional requirements for that Work, and further requirements thereof (if any) will be issued by change order.
- B. The type of allowances scheduled herein for the Work include the following:
  - 1. Lump sum allowances.
- C. Selection and Purchase: At the earliest feasible date after the award of the Contract, advise the Architect of the scheduled date when the final selection and purchase of each product or system described by each Allowance must be accomplished in order to avoid delays in the performance of the Work. Obtain and submit proposals for the Work of each Allowance, as required by the Architect for use in making the final selections; include whatever recommendations for selection may be relevant to the proper performance of the Work. Purchase products and systems as specifically selected (in writing) by the Architect.
  - 1. Submit proposals and recommendations, for the purchase of the products or systems of Allowances, in the form specified for change orders.
- D. Change Order Data: Where applicable, include in each change order proposal both the quantity of the products being purchased and the unit cost, along with the total amount of the purchase to be made. Where requested, furnish survey-of-requirements data to substantiate the quantity. Indicate applicable taxes, delivery charges, and amounts of applicable trade discounts.
- E. Lump-Sum Allowances: The amounts herein specified are the net amounts available for purchase of the materials specified, including taxes (if any), and each change order amount shall be based thereon. <u>All other costs associated with the performance of the Work under the Allowance, including but not limited to insurance, storage, handling, overhead, profit, etc., are not a part of the allowance, and shall be included in the lump sum bid / or base bid Contract amount.</u>
  - 1. In the event the actual purchase amount of materials, plus taxes (if any) exceeds the specified allowance, the Owner will pay the excess; should the actual purchase amount, plus taxes (if any) be less than the specified Allowance, the Contractor shall credit the Owner with the difference.
  - 2. The actual purchase amount, plus taxes (if any) shall be substantiated by certified bills of sale to be submitted with the change order.

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- F. Change Order Mark-Up: Except as otherwise indicated, comply with the provisions of the General Conditions and the Supplementary General Conditions.
- G. Excess Materials: Submit invoices or delivery slips to indicate the actual quantities of materials delivered to the site for use in fulfillment of each allowance. Where economically feasible, and so requested by the Architect, return unused materials to the manufacturer/supplier for credit to the Owner, after the installation has been completed and accepted. Where not economically feasible to return for credit, and so requested by the Architect, prepare unused materials for the Owner's storage, and delivery to the Owner's storage space as directed. Otherwise, disposal of excess materials is the Contractor's responsibility.

## **1.2 SCHEDULE OF ALLOWANCE**

- A. General: The following allowance amount is included in the Contract Sum, for the corresponding unit of Work, as described.
  - 1. Construction Work
    - a. A sum of **<u>\$60,000.00</u>** for work not specifically shown on the Drawings, the work shall be performed as directed in the field.

## **END OF SECTION 01020**

### SECTION 01040 - COORDINATION

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. The Work of this Section applies to all Construction Bid Documents including Drawings, Division 1 - Miscellaneous Requirements Sections and Specifications Sections included in Part-2 through Part-6.

## **1.2 REQUIREMENTS INCLUDED**

- A. Coordination of submittals.
- B. Coordination meetings.
- C. Coordination drawings.
- D. Coordination of project closeout.
- E. Administrative/supervisory personnel.
- F. Coordination of trades.
- G. Coordination of space.
- H. Coordination of field measurements and field conditions.

### **1.3 GENERAL REQUIREMENTS**

- A. The Prime Contractor shall coordinate their activities with the activities of their Subcontractors and Work performed by others.
- B. If necessary, inform each party involved, in writing, of procedures required for coordination; include requirements for giving notice, submitting reports, and attending meetings.
  - 1. Inform the Architect when coordination of their Work is required.

### 1.4 COORDINATION OF SUBMITTALS

- A. Coordinate and correlate the submittals on each Work item and on interrelated Work items to ensure their timeliness, completeness, consistency, compatibility and compliance with the Bid Documents.
- B. Prepare and submit special coordination drawings where close and careful coordination of information is required for proper fabrication or installation of

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materials, products or equipment by separate entities. Coordination drawings may also be required where limited space availability necessitates close and careful coordination for efficient and proper installation of different components.

- 1. Show interrelationships of components shown on separate shop drawings.
- 2. Indicate required installation sequences.
- 3. (See also the requirements for the general coordination drawings under paragraph 1.7 below).
- C. Coordinate any request for substitution to ensure compatibility of its space requirements, its operating characteristics and elements and its effects on other Work. Prior to proposing a substitution for any item, verify that its size, configuration, supports and connections will coordinate with all other Work and that it will fit within the allotted space while allowing for proper operating, maintenance and circulation space.
- D. Comply with requirements for requests for submittal of substitution indicated in AIA A201 and Section 00800.

## 1.5 COORDINATION MEETINGS

- A. The General Construction Work Contractor shall hold additional coordination meetings and conferences with Subcontractors and others involved in the Work as needed to ensure coordination of Work.
  - 1. Notify the Architect of such coordination meetings.
- B. Regular project site meetings shall be in accordance with Sections 00870 and 01200.

## 1.6 COORDINATION OF TRADES

- A. Coordinate construction activities included under various sections of these Specifications to ensure efficient and orderly installation of each part of the Work and to prevent interferences among parts of the Work. Coordinate Work items and construction operations included under different sections of the Specifications that are dependent upon one another for proper installation, connection and operation.
  - 1. Where installation of one part of the Work is interrelated with installation of other components, schedule construction activities in the sequence required to obtain the best results.
  - 2. Where availability of space is limited, coordinate installation of different components to prevent interferences and to ensure proper accessibility for required maintenance, service and repair.

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- 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Where necessary, prepare memoranda outlining special procedures required for coordination. Include such items as required notices, reports and attendance at meetings. Distribute these coordination memoranda to all parties involved in the Work being coordinated.
  - 1. Prepare similar memoranda for the Owner and other Contractor(s) where coordination with construction or operations by them is required.
  - 2. Provide copies of such coordination memoranda to the Architect.
- C. Coordinate the scheduling and timing of required administrative activities with other construction activities to avoid conflicts and ensure orderly progress of the Work. Administrative activities include:
  - 1. Preparation and updating of schedules.
  - 2. Preparation and processing of submittals.
  - 3. Preparation and processing of requests for information.
  - 4. Project meetings.
  - 5. Testing and inspection activities.
  - 6. Project close-out activities.

# 1.7 COORDINATION DRAWINGS

- A. General Requirements: Prepare coordination drawings where limited space available may cause conflicts in the locations of installed products, and where required to coordinate installation of products.
  - 1. In preparing the coordination drawings, large scale details as well as cross and longitudinal sections shall be developed as required to fully delineate all conditions. Particular attention shall be given to the locations, size and clearance dimensions of equipment items, shafts and similar features.
  - 2. In preparing the coordination drawings, minor changes in duct, pipe or conduit routing that do not affect the intended functions may be made as required to avoid space conflicts, when mutually agreed, but items may not be resized or exposed items relocated or other features affecting the function or aesthetic effect of the building changed without the Architect's prior review and acceptance. It should be assumed that no changes shall be made in any wall or chase locations, ceiling heights, door swings or locations, or window or other openings. If conflicts or interferences cannot be satisfactorily resolved, then the Architect shall be notified and their determinations obtained. Any conflicts or design deviations shall be specifically identified on Drawings submitted to them.

- 3. The coordination drawings shall be submitted, in all cases, in ample time to avoid construction delay. The coordination drawings submitted may lack complete data in certain instances pending receipt of shop drawings, but sufficient space shall be allotted for the items missing, as evidenced by the sign-off of the party responsible for the missing items. When the missing information is available, it shall be promptly incorporated in the composite drawings.
- 4. Cost and time impacts of relocating any duct, pipe, conduit, or other material that has been installed without proper coordination between all trades involved will be charged to the responsible party. If any improperly coordinated Work or Work installed that is not in conformance with the approved coordination composites necessitates additional Work, the cost and time impacts of all such additional Work shall likewise be the responsibility of the affective party. The Architect shall be the sole judge in determining all responsibilities.
- 5. All changes in the scope of Work due to revisions formally issued and approved shall be shown on the composite Drawings.
- 6. All Work on the coordination drawings shall be performed by a competent draftsmen and shall be clear and fully legible. The Architect shall be the judge of the legibility of the composite Drawings.
- 7. In particular, prepare the following coordination drawings:
  - a. Drawings showing all piping, duct, cabletrays, electrical ductbanks, and similar items, but not electrical conduit less than 4 inches in diameter.
  - b. Complete architectural, mechanical and electrical reflected ceiling layouts, (including ductwork, conduits, piping, lighting, etc.).
  - c. Special coordination drawings are to be provided for the following:
    - 1) Where space is limited, show plan and cross-section dimensions of space available, including structural obstructions and ceilings as applicable.
- B. The Prime Contractor shall prepare the coordination drawings required for their Work.
- C. Layout Drawings: As soon as practical, but in no case starting later than thirty (30) days after <u>the Prime Contractor</u> has received the notice to proceed, <u>the HVACR</u> <u>Work Subcontractor shall prepare layout Drawings</u> of all ductwork and piping at not less than 3/8" scale.
  - 1. These Drawings shall show registers, grilles, diffusers and similar features, as well as locations of all units, valves, dampers and other items requiring access for service and maintenance.
  - 2. The Drawings shall also show roof, floor and wall openings, reflected ceiling layouts, structural beams, framing and miscellaneous structural steel supports,

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ceiling heights, walls, floor to floor dimensions, structural columns, doors and other major architectural and structural features as shown on the architectural and structural Drawings and as per approved shop drawings.

- D. Composite Drawings:
  - 1. <u>The HVACR Work Subcontractor</u> shall, as scheduled by the General Contractor, produce a mylar, two (2) prints and one (1) sepia of each layout drawing as described.
  - 2. The sepia will be retained for their records while the mylar and two (2) prints will be formally transmitted to the Plumbing Subcontractor, with copies of the transmittal to the Architect.
  - 3. These Drawings must be hand delivered or sent via a reliable mailing service that provides receipts and guarantees 24-48 hour delivery.
    - a. Common carrier mailing will not be acceptable.
  - 4. <u>The Plumbing Work Subcontractor</u>, upon receipt of these mylars, will transfer the Work from their shop drawings to the mylars, at the same time indicating where conflicts exist between their Work and the Work already shown on the mylars.
    - a. The Plumbing Work Subcontractor will utilize a <u>green colored</u> pencil for the layout of their Work.
    - b. After completion, the Plumbing Subcontractor will forward the mylars and two (2) prints to the Electrical Subcontractor while retaining a sepia for their records.
    - c. The same mailing procedures will pertain.
  - 5. <u>The Electrical Work Subcontractor</u> will duplicate the procedure outlined above, utilizing <u>orange colored</u> pencil for their layout.
    - a. After completion the Electrical Subcontractor will forward the Drawings as specified above to the <u>Fire Protection Work Subcontractor</u>, <u>((Plumbing Work Subcontractor)</u>), if applicable, who will layout their Work with a <u>red pencil</u> and, after completion, forward the Drawings to the General Contractor, retaining a sepia for their records.
  - 6. The General Construction Work Contractor shall then have the HVACR's instrumentation (ATC) Work Subcontractor review the completed composite Drawings and attest to their concurrence that their Work can be installed without conflict.
  - 7. The General Construction Work Contractor will schedule coordination meetings on the job site to review the coordination drawings.
    - a. These meetings will be attended by a representative from each of the Subcontractors involved in the coordination process.

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- b. At these meetings, these Subcontractors will indicate where conflicts exist and resolve the conflicts through mutual agreement.
- c. Should an impasse occur, the Architect will determine the resolution.
- 8. When all conflicts are resolved, the Subcontractors will indicate their agreement by signing these final composite drawings.
- 9. The Drawings shall be signed-off by each of the involved Subcontractors, indicating their awareness of and agreement with the indicated routings and layouts and their interrelationship with the adjoining or contiguous Work. The General Contractor shall then sign these final composite drawings.
- 10. The final composite drawings shall be completed and signed-off by all parties no later than ninety (90) calendar days after the General Construction Work Contractor has received the Notice to Proceed.
  - a. After the final composite drawings have been agreed upon and signed by the Subcontractors and by the General Construction Work Contractor, the General Construction Work Contractor shall provide and distribute prints to each of the Subcontractors, and four (4) sets of prints to the Architect for reference and record purposes.
  - b. The record copies of the signed-off final composite drawings shall be retained by the General Construction Work Contractor and each Subcontractor as working reference documents.
  - c. All shop drawings, prior to their submittal to the Architect, shall be compared with these composite drawings and developed accordingly.
    - 1) Any revisions to the composite drawings which may become necessary during the progress of the Work shall be noted by the General Construction Work Contractor and by each affected Subcontractor and shall be neatly and accurately recorded on their record copies.
- 11. The General Construction Work Contractor and each Subcontractor shall be responsible for the up-to-date maintenance of their record copies of the composite drawings and for having one up-to-date copy available at the site.
- 12. The composite drawings, incorporating any subsequent changes thereto, shall be utilized by the General Construction Work Contractor or each Subcontractor in the development of their record drawings.
- 13. Following sign-off of the final composite drawings, no deviations will be permitted without prior review and acceptance by the Architect.
  - a. Unauthorized deviations will be subject to removal and correction at no additional cost to the Owner.
- 14. In areas where no HVAC Work occurs, but where other mechanical and electrical installations are required, each involved Subcontractor or Prime

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Contractor shall be responsible for their own Work and shall cooperate, as directed by the General Construction Work Contractor, in preparing similar layout and composite drawings.

# 1.8 COORDINATION OF PROJECT CLOSEOUT

- A. Coordinate completion and clean-up Work and administrative activities in preparation for Substantial Completion and occupancy of the Work or of designated portions of the Work.
- B. After Owner occupancy, coordinate access for completion or correction of the Work not in conformance with the Bid Documents to minimize disruption of Owner's activities.
- C. Assemble and coordinate closeout submittals specified in Section 01700.

## 1.9 REQUIRED ADMINISTRATIVE / SUPERVISORY PERSONNEL

- A. General: In addition to the other administrative and supervisory personnel required for the performance of the Work, each Prime Contractor shall provide specific coordinating personnel as specified herein.
- B. Project Manager / Superintendent: A full time on site Project Manager, with a recommended minimum of eight (8) years experience, including project management experience on a similar type of projects.
  - 1. <u>The Contractor for General Construction Work</u> shall provide a full-time staff member or members, (Project Manager/Superintendent), experienced in coordination of mechanical and electrical Work on projects of this type and scale, including administration and supervision.
    - a. Responsibilities:
      - 1) Coordinate all mechanical, plumbing, and electrical Work, and coordinate that Work with the other Work of the project.
      - 2) Where space is limited, coordinate arrangement of mechanical, electrical, and other Work to fit.
      - 3) Coordinate cutting and patching activities and sequencing.
      - 4) Coordinate use of temporary facilities.
    - b. Prepare coordination drawings where required and where indicated.
    - c. Provide information to the entity preparing the progress schedule.
    - d. Participate in progress meetings; report progress, changes required in schedules, and unresolved problems.
    - e. Review submittals for compliance with the Bid Documents and for coordination with other Work.
    - f. Check field dimensions, clearances, relationships to available space, and anchors.
    - g. Check compatibility with equipment, other Work, electrical characteristics, and operational control requirements.

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- h. Check motor voltages and control characteristics.
- i. Coordinate controls, interlocks, wiring of switches, and relays.
- j. Coordinate wiring and control diagrams.
- k. Review the effect of changes on other Work.
- I. Obtain and distribute installation data on each item of equipment requiring mechanical or electrical connections; include:
  - 1) Electrical power characteristics.
  - 2) Control wiring requirements.
- m. Observe and maintain record of tests and inspections.
- n. Observe Work for compliance with Bid Documents and notify the applicable contractor in writing of observed defects in the Work.
- o. Coordinate and observe startup and demonstration of equipment and systems.
- p. Coordinate maintenance of record documents.
- q. Assist the Architect with final inspections.
- 2. Subcontractor(s) shall provide staff for coordination between trades. Staff requirements noted above represent the minimum full-time on site staff required.
- 3. Staffing is subject to Owner / Architect's approvals.
- 4. Staff members may not be removed or replaced without Owner/Architect's approvals.
- 5. Staff name(s), duties and resumes are to be submitted to the Architect for approval within fifteen (15) days of the Notice to Proceed.

### 1.10 COORDINATION OF TRADES

- A. Coordinate Work with other trades to eliminate any possible interference before any piping, conduit, equipment, devices, controls, supports, ductwork and fixtures are installed.
- B. Where multiple items of mechanical and electrical equipment, devices, piping, conduits, supporting metal work, hangers, pull boxes, outlets, ductwork or controls are shown on any of the Bid Documents of the various trades in the same location, coordinate and adjust items to fit within designated location(s).
- C. Provide and install necessary offsets, bends, turns and modifications in piping, ductwork, conduit and devices required to install the Work without interference with that of other trades or structure, without additional cost to the Owner.
- D. For products specified to be furnished by one Contractor and installed by another Contractor:

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- 1. Contractor specified to furnish (or remove) product shall be responsible for delivery to (or return from) the project site, and shall pay transportation costs.
- 2. Contractor specified to install product shall be responsible for coordinating product delivery, loading or unloading, storing, protecting and installing product as required.

## 1.11 COORDINATION OF SPACE

- A. Coordinate use of available space and sequence of installation for Work (e.g., mechanical and electrical Work) which is indicated diagrammatically or schematically on the Drawings. Prevent physical interference of components. Follow routing shown for pipes, ducts and conduits, taking into account the limitations of available space; make runs parallel with lines of building. Utilize space efficiently to ensure proper installations (including installation of other Work) and accessibility for maintenance, service and repairs.
- B. Detailed Drawings of proposed departures from spatial arrangements or locations indicated in the Bid Documents, due to field conditions or other causes, shall be submitted to the Architect for review. No such departures shall be made without prior review by the Architect.
- C. Where required for coordination, the Architect will have the authority to order, as changes in the Work, changes in locations and sizes of piping, ductwork conduit, raceways and ducts. Such changes shall be made without adjustment to the Contract Sum or Contract Time.
- D. Field verify measurements of existing items and Work which precedes each sequence. Ensure proper fit and location.
- E. In finished areas, conceal pipes, ducts and wiring in the construction.
- F. Coordinate locations of fixtures and outlets with finish elements.

## 1.12 COORDINATION OF FIELD MEASUREMENTS AND FIELD CONDITIONS

- A. Prior to ordering materials or equipment or performing Work, the Contractor and/or Subcontractors shall verify Contract Document and submittal of dimensions and weights affecting their Work and other Contractor's Work associated with field measurements and field conditions at the project site and shall be responsible for their accuracy and correctness.
- B. Differences discovered from dimensions or weights indicated in the Bid Documents or submittals shall be submitted in writing to the Architect for review, before proceeding with the Work.

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- C. Commencing Work implies acceptance of surfaces, areas, preceding Work and other field conditions, and verification of dimensions by the Contractor.
- D. No Change Order will be issued in cases where discrepancies in dimensions are discovered after Work has been commenced or where the Contractor has failed to properly investigate and take into account field measurements and existing field conditions.
- E. Inspection of Conditions: Require the Installer of each major component to inspect both substrate and conditions under which their Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- F. Recheck measurements and dimensions, before starting each installation.
  - 1. Submit to the Architect for review any change in dimensions shown on the Bid Documents or submittals affecting physical size, shape or location of any part of the Work, whether due to field conditions or other causes.
- G. Passage of Equipment:
  - 1. Establish passage clearances required to deliver, install and erect mechanical and electrical equipment. Wherever necessary, provide equipment in sections or knocked down in order to allow passage of equipment through available openings.
  - 2. Where there is not sufficient clearance for passage of mechanical or electric equipment, deliver, install and protect such equipment before confining walls, floors, slabs and steel Work are erected. Schedule and coordinate this Work with the Work of other trades.
  - 3. If any structure, equipment or system must be altered to allow passage of equipment, the person or entity responsible for providing that structure, equipment, or system shall restore it to its original condition, without additional cost to the Owner.
  - 4. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Bid Documents.
- H. Verify the size of shafts and chases, the adequacy of partition thickness and the clearance in double partitions and hung ceilings for proper installation of Work.
  - 1. (Sub)Contractors shall cooperate in arranging their Work with other (Sub)Contractors whose Work is in the same spaces.

- 2. The amount of space occupied by each trade's Work shall be kept to the minimum required.
- 3. Arrange for chases, slots and openings in other building components during progress of construction, to allow for timely installation of Work.
- I. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- J. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- K. Provide all appropriate structural supports, hangers, wires for roof, floor and wall and associated assemblies which include but are not limited to materials, finishes, equipment, fixtures, piping, raceways, mechanical and electrical components. This Work shall be in conformance with requirements of the Bid Documents whether or not indicated by a reference in Specification or as may be in detail shown on Drawings and schedules.
- L. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- M. Install each component during weather conditions and construction status that will ensure best possible results. Isolate each part of completed construction from incompatible material as necessary to prevent deterioration.
- N. Coordinate temporary enclosures with required inspections and tests, to minimize necessity of uncovering completed construction for that purpose.
- O. Where mounting heights are not indicated:
  - 1. Install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.
  - 2. Install mechanical and electrical systems, materials and equipment to provide maximum possible headroom. Maintain maximum headroom and space conditions. Where headroom or space conditions (less than 8'-0") appear inadequate, the Architect shall be notified before proceeding with the Work.

## END OF SECTION 01040

## SECTION 01050 - ALTERATIONS, CUTTING, PATCHING AND REFINISHING WORK

### PART 1 - PRODUCTS

### 1.1 RELATED DOCUMENTS

A. The Work of this Section applies to all Construction Bid Documents including Drawings, Division 1 - Miscellaneous Requirements Sections and Specifications Sections included in Part-2 through Part-6.

## 1.2 **DESCRIPTION**

- A. Work included: Alterations, removals and demolition required for this Work include, but are not necessarily limited to:
  - 1. Alterations, cutting, patching, removal and preparation Work to be done as noted on Drawings, as required, to complete construction.
  - 2. Patching and refinishing of existing surfaces damaged or left unfinished as a result of this Work, including site work, existing ground surfaces, concrete surfaces, bituminous paving surfaces, etc.
  - 3. Asbestos.
    - a. The Contractor shall review and familiarize themselves with the Owners Asbestos Hazard Emergency Response Act (AHERA) report prior to the commencement of any demolition activity. Also, the Contractor will be provided with an inventory of all ACM (Asbestos Containing Materials) in the building(s) where they are working, and will be required to sign a form (provided by the Owner) that they are in receipt of the inventory.
    - b. Contractor is herein cautioned that asbestos may be within concealed spaces where Work will be taking place. The Contractor shall immediately notify the Owner if any concerns or conditions arise in regards to potential asbestos containing building materials (ACBM's) in order that the Owner may verify same and take appropriate action. The Contractor shall not proceed with the Work until the material has been abated and air sampling clearance levels have been achieved as set forth by the Owner's Environmental Consultant.
    - c. The Contractor shall employ personnel who are trained in accordance with OSHA workplace standards as they pertain to asbestos.
    - d. The Architect / Engineer has no authority or professional involvement relative to the hazardous material/asbestos removal or disposal phase for this project and are not available for questions and/or direction in this regard. The hazardous material/ asbestos reference is included as a convenience for the Owner, and the Architect accepts no responsibility nor liability for the accuracy of information, bidders conclusions, methods to be used, nor for any aspect of approvals required by the Contractor in undertaking and completing this project insofar as

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## hazardous material/asbestos is concerned. The Contractor shall direct any/all questions and concerns to the Owners Hazardous Material Abatement Consultant.

- e. Worker and Community Right to Know Act Requirements
  - 1) It is required that the Contractor and/or Subcontractors comply with all of the requirements of HAZCOM 2012 and New Jersey Right To Know (RTK) program. Prime Contractor is responsible for ensuring that containers of substances belonging to the Contractor and/or Subcontractors that are stored at the Owner's facility are properly RTK labeled. Refer to N.J.A.C. 8:59-5.10.
  - 2) Surveys of hazardous substances stored at the Owner's facility by the Contractor and/or Subcontractor are to be provided to the Owner of the facility. Refer to N.J.A.C. 8:59-2.2(h).
  - 3) Material Safety Data Sheets (MSDS) and/or Safety Data Sheets (SDS) from manufacturers must be provided to the Owner for all products present at, purchased for, and brought on site by Contractors and/or Subcontractors to the Owner's facility. Refer to N.J.A.C. 8:59-2.2(1).
  - 4) Contractor and/or all Subcontractors must submit, prior to starting any Work, a copy of their approved Hazard Communication Plan 29 CFR 1910.1200.
- 4. This project shall be subject to the requirements of the EPA "Renovation, Repair and Painting" rule including the following:
  - a. The Contractor must be lead safe trained and certified. The Contractor will be required to submit a copy of their EPA certificate prior to the start of the Work.
  - b. The Contractor shall provide the Owner with a copy of the EPA's Lead Hazard Management information pamphlet "Renovate Right-Important Lead hazard Information for Families, Child Care Providers and Schools" prior to the start of any renovation Work. The Contractor shall have the Owner sign a pre-renovation disclosure form confirming receipt of the pamphlet.
  - c. The Contractor shall at all times employ lead safe practices as identified in the rules.
- 5. This project shall be subject to the requirements of the EPA rules on diesel exhaust and off-site particulate dust, including the following:
  - a. Diesel exhaust contributes the highest cancer risk of all air toxics in New Jersey and is a major source of NOx within the state. Therefore, per NJ DEP recommendations, construction projects involving non-road diesel construction equipment operating in a small geographic area over an extended period of time shall implement the following measures to minimize the impact of diesel exhaust:
    - 1) All on-road vehicles and non-road construction equipment operating at, or visiting, the construction site shall comply with the three minute idling limit, pursuant to <u>N.J.A.C.</u> 7:27-14 and <u>N.J.A.C.</u> 7:27-15. Contractor shall purchase "No Idling" signs to post at the site to

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remind Subcontractors to comply with the idling limits. Signs are available for purchase from the Bureau of Mobile Sources at 609/292-7953 or <u>http://www.stopthesoot.org/sts-no-idle-sign.htm</u>.

- 2) All non-road diesel construction equipment greater than 100 horsepower used on the project for more than ten days shall have engines that meet the USEPA Tier 4 non-road emission standards, or the best available emission control technology that is technologically feasible for that application and is verified by the USEPA or the CARB as a diesel emission control strategy for reducing particulate matter and/or NOx emissions.
- 3) All on-road diesel vehicles used to haul materials or traveling to and from the construction site shall use designated truck routes that are designed to minimize impacts on residential areas and sensitive receptors such as hospitals, schools, daycare facilities, senior citizen housing, and convalescent facilities.
- b. Contractor will be liable for the effects of off-site particulate dust and/or odors during construction and shall take steps to minimize the impact of air pollution from these activities.

## 6. Hot Work Permit:

- a. A Hot Work Permit is required for any operation involving "open flame" or "producing heat and/or sparks".
  - 1) This Work includes, but is not limited to, welding, brazing, cutting, grinding, soldering, thawing pipe, torch-applied roofing, or chemical welding.
- b. Before initiating hot Work, ensure precautions are in place as required by NFPA 51B and ANSI Z49.1.
- c. Make sure an appropriate fire extinguisher is readily available.
- B. Related Sections:
  - 1. Section 00870 Miscellaneous Requirements.
  - 2. Section 01010 Summary of the Work.
  - 3. Section 01020 Allowances.
  - 4. Section 01040 Coordination.
  - 5. Section 02070 Selective Demolition.
  - 6. Division 2 through 26 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
    - a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 22, 23 and 26 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

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## 1.3 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. Location and Extent of Work: Submit key plan indicating room location where Work to take place. Describe cutting and patching, indicate methods and show how they will be performed.
  - 2. Changes to Existing 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. Provide samples and field mock-up as indicated or requested by the Architect.
    - a. Samples and field mock-up shall match existing surfaces and colors.
    - b. Obtain Architect's approval prior to proceeding with Work.
  - 4. Schedule and Dates: Provide work schedule, indicate when cutting and patching will be performed.
  - 5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
  - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, 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.

# 1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Coordinate cutting of operating elements with other plumbing, HVAC, electrical or other trades.
- C. Miscellaneous Building Elements: Do not cut and patch any building elements or related components in a manner that could change their operation, load-carrying

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capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
  - 1. Engage experienced installers or fabricators for all Work.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- F. Mock-Ups: Provide mock-ups for Architect approval for each proposed patching method. Do not proceed with patching Work until obtaining of approvals from the Architect.

## 1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties. Confirm existing warranties with Owner prior to starting of Work.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

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

## PART 3 - EXECUTION

## 3.1 **EXAMINATION**

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

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- 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.
- B. Inspection:
  - 1. Prior to start of any Work the General Construction Work Contractor shall verify all existing work area conditions; building lines, lengths, corners and all other dimensions.
    - a. Copies of all surveys performed by the General Contractor shall be submitted to the Architect in two copies and shall include layout Drawings and data sheets.
  - 2. The General Construction Work Contractor shall submit information and survey to other Prime Work (Sub)Contractor(s), the Architect for all required coordination of new construction work.
  - 3. Prior to work of this section, verify information and survey submitted by the General Construction Work Contractor, carefully inspect the existing conditions and verify that materials and surfaces to be altered or removed are the same as noted on the Drawings.
- C. Discrepancies:
  - 1. In the event of discrepancy of existing conditions, surfaces, etc., immediately notify the Architect.
  - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

# 3.2 **PREPARATION**

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

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## 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. The Contractor shall provide cutting, patching, relocations, and or re-installations of existing construction to provide for installation of other components or performance of other construction associated with their Work, and subsequently patch and finish as required to restore surfaces to their original condition. Work shall be performed whether or not shown on Drawings.
  - 2. The General Construction Work Contractor shall provide all required and necessary pockets in concrete and masonry walls and in new roof assemblies including all required cutting, and preparation Work to allow for installation of new structural steel framing, supports, lintels, bearing plates, dunnage, etc. The General Construction Work Contractor shall subsequently patch as required to restore and prepare surfaces to receive new finishes.
    - a. Cutting roof decking, roof flashing, patching and associated roofing Work in <u>existing building(s)</u>, where no roofing replacement is indicated or required, shall be performed by the Prime Contractor / Subcontractor for Work included under the Contract.
  - 3. All repairing, patching, piecing out, filling in, restoring and refinishing shall be neatly done by craftsworkers skilled in their respective trades and completed in proper manner to leave same in condition satisfactory to the Architect.
  - 4. All new Work shall be installed plumb, level, true, and shall be shimmed as required to cover any irregularities in substrates.
- B. Cutting:
  - 1. Before cutting is started in any location the Contractor shall carefully investigate conditions as to human and structural safety, existing piping, wiring and items concealed, and wherever same interfere with the Work they shall be properly relocated, rerouted or removed as the case may be, at no increase to Contract price.
  - 2. Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 3. 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

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size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

- 4. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
- 5. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
- 6. Do not disturb any structural Work, plumbing, steam, gas, or electric Work without approval of Architect.
- 7. Mechanical and Electrical Services:
  - a. Cut off pipe or conduit in walls or partitions to be removed shall be performed by respective trade.
  - b. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting shall be performed by respective trade.
- 8. Proceed with patching after construction operations requiring cutting are complete.
  - a. Remove, cut, alter, replace, patch and repair existing Work as necessary to install new Work.
- 9. Existing Work disturbed or removed as a result of performing required new Work, shall be patched, repaired, reinstalled or replaced with new Work, and refinished and left in as good condition as existing before commencing Work.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
  - 2. Field Mock-up: Prepare field mock-up of proposed restoration method as requested or required by the Architect. Obtain Architect's approval prior proceeding with actual Work.
  - 3. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate or minimize evidence of patching and refinishing.
  - 4. Floors and Walls: Where walls, partitions and/or built-in cabinets that are removed extend one finished area into another, patch and repair floor and wall

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surfaces in the existing and new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
- 5. Ceilings: Cut, remove, patch, repair, install new including hanging assemblies and finish ceilings as necessary to provide an even-plane surface of uniform appearance.

## 3.4 CLEAN-UP

- A. Areas where demolition is in progress within or adjacent to Owner occupied areas shall be broom cleaned at the end of each working day.
- B. Do not burn materials or debris on premises.
- C. Do not allow demolished materials to accumulate inside or outside of existing building.
- D. Remove from the site all rubbish and debris resulting from Work of this section.
- E. If the Contractor fails to clean-up their debris within 24 hours, the Owner has the right to clean-up the debris left by the Contractor. All associated clean-up costs, incurred by the Owner, will be back-charged to the Contractor.

# 3.5 **PROTECTION**

- A. Contractor shall provide all other necessary temporary enclosures, guardrails, barricades, etc. to adequately protect all workers and public from possible injury. Provide all necessary temporary partitions, enclosures, coverings of approved materials and construction for the exclusion of weather and for confining dust and debris.
- B. Contractor shall be responsible for the protection of the existing building, facilities and improvements within the areas where Work is being done. Any disturbance or damage to the Work, the existing building, and improvements, equipment or any impairments of facilities resulting from their Work, shall be promptly restored, repaired, or replaced by the responsible Contractor at no extra cost to the Owner.
- C. Adequate protection of persons and property shall be provided at all times, including Saturdays, Sundays and holidays, and during time Work is being performed and after working hours. Protection shall include barricade fencing, traffic control, dust partitions, weather protection and other means, as required.

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D. Preserve and protect all existing vegetation such as trees, shrubs, and grass on or adjacent to the site and along access to the site. Be responsible for all unauthorized cutting or damaging of trees and shrubs, including damage due to careless operation of equipment, stock-piling of materials or tracking of grass areas by equipment.

## 3.6 SALVAGE

- A. Partial Removal: Items of salvable value to Contractor may be removed from structure as Work progresses. Salvage items must be transported from site as they are removed.
  - 1. Storage or sale of removed items on site <u>will not</u> be permitted.
- B. Items designated on Drawings or in Specifications to remain the property of the Owner, or to be reused, shall be removed, and securely stored with care to prevent damage. Repair or replace such items damaged in removal.
- C. Before transporting non-designated, removed items from the site, contact Architect for decision as to what items if any are to remain the property of the Owner. Items retained by the Owner will be transported by them to their storage area.

# 3.7 STANDARDS

- A. All demolition Work shall be performed in accordance with the applicable rules and regulations and the Codes and Ordinances of local, State and Federal authorities, and in accordance with the requirements of public utility corporations.
- B. Work shall satisfy requirements of the Occupational Safety and Health Act of 1970 with amendments.
- C. Work not affected by more stringent requirements of regulatory agencies shall satisfy the provisions of ANSI-A10.6-2006 (R2016) American National Standard Safety Requirements for Demolition.
- D. Confine the movement and storage of vehicles, equipment and materials to such routes and locations as may be designated by the Owner and Architect.
- E. The building and grounds will be maintained in a clean and orderly manner so as to conform with all local fire safety regulations and in accordance with the latest editions of the Safety Code of the National and State Board of Fire Underwriters.

## 3.8 INGRESS, EGRESS AND CIRCULATION

A. The Prime Contractor shall be responsible for performing their construction activities in such manner to maintain ingress and egress for visitors and occupants of Owneroccupied areas and to continuously maintain all required emergency exits from and

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circulation between existing facilities. Passageways for emergency exits shall be kept continuously free from debris, construction equipment, tools, stockpiles or materials, and other hazards to speedy evacuation. The Contractor shall provide all necessary temporary Work as prudence and good practice may dictate and in accordance with Applicable Law and Authorities Having Jurisdiction to obtain and maintain all such ingress, egress and circulation requirements. The Prime Contractor shall be responsible for providing coordination of this temporary Work between Subcontractor(s), as directed by the Architect. All temporary Work shall be removed when no longer required.

## 3.9 NON-INTERFERENCE WITH OWNER'S OPERATIONS

- A. Work under this Contract will be performed when the existing buildings are occupied. Coordinate with Owner's schedule and operation, obtain Owner's approval prior to proceeding with Work.
- B. Contractor shall acquaint themself with the general character of the Owner's operations prior to commencing Work and shall schedule their Work to avoid interference therewith. The sequence of alteration operations shall be in accordance with a schedule of Contract operations approved by the Owner and Architect.
- C. The Contractor shall not start Work until the schedule has been approved in writing by the Architect and the Owner. The Contractor shall not perform Work in occupied areas without giving the Owner 72 hours written notice of their intention to Work in occupied areas.
- D. The Contractor shall expedite placing orders and submission of shop drawings for equipment required to complete Work under this Contract to ensure delivery of all equipment with adequate time allowed to complete the installations to conform to the project completion date.

## END OF SECTION 01050

### **SECTION 01151 - UNIT PRICES**

### **PART 1 GENERAL**

### 1.1 **PROCEDURE**

- A. Bidder shall insert on the Proposal Form, all Unit Prices applicable to the Work under their bid. Unit Prices will be used as the basis for computing "additions to" or "deductions from" the Contract Price for extra work and for work countermanded, reduced or omitted.
- B. Except as otherwise provided in the General Conditions, the Unit Prices when accepted, adjusted or established by the Contract shall remain binding and irrevocable for the entire period of the Contract, regardless of the quantities of Work ordered or required under such Unit Prices.
- C. The acceptance of the Unit Price is on condition that the general character of the material and workmanship required for any Work related thereto shall be equivalent to corresponding Work as shown and specified, and that all costs, overhead and profit, as well as all incidental work required in connection therewith, has been included in the Unit Price.

## 1.2 UNIT PRICES - GENERAL CONSTRUCTION: Materials in Place.

Self-Drying Finishing Underlayment per Section 03450 \$\_\_\_\_\_ per sq. ft.

### 1.3 UNIT PRICES - PLUMBING & DRAINAGE: Materials in Place.

1-1/2" sanitary and vent pipe above grade	\$ _ per lin. ft.
2" sanitary and vent pipe above grade	\$ _ per lin. ft.
2-1/2" sanitary and vent pipe above grade	\$ _ per lin. ft.
3" sanitary and vent pipe above grade	\$ _ per lin. ft.
2" sanitary and vent pipe below grade	\$ _ per lin. ft.
3" sanitary and vent pipe below grade	\$ _ per lin. ft.
4" sanitary and vent pipe below grade	\$ _ per lin. ft.
1/2" domestic water pipe above ground with insulation	\$ _ per lin. ft.
3/4" domestic water pipe above ground with insulation	\$ _ per lin. ft.
1" domestic water pipe above ground with insulation	\$ _ per lin. ft.
1-1/4" domestic water pipe above ground with insulation	\$ _ per lin. ft.

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1-1/2" domestic water pipe above ground with insulation	\$	_ per lin. ft.
1" black steel schedule 40 pipe	\$	_ per lin. ft.
1-1/2" black steel schedule 40 pipe	\$	_ per lin. ft.
2" black steel schedule 40 pipe	\$	_ per lin. ft.
2-1/2" black steel schedule 40 pipe	\$	_ per lin. ft.
2" cast iron pipe below grade	\$	_ per lin. ft.
2-1/2" cast iron pipe below grade	\$	_ per lin. ft.
3" cast iron pipe below grade	\$	_ per lin. ft.
4" cast iron pipe below grade	\$	_ per lin. ft.
1-1/2" copper DWV tube above floor	\$	_ per lin. ft.
2" service weight cast iron pipe below floor, including concrete floor cutting, excavation and backfill. Final floor patching by GC.	\$	_ per lin. ft.
3" service weight cast iron pipe below floor, including concrete floor cutting, excavation and backfill. Final floor patching by GC.	\$	_ per lin. ft.
4" service weight cast iron pipe below floor, including concrete floor cutting, excavation and backfill. Final floor patching by GC.	\$	_ per lin. ft.
UNIT PRICES - HEATING AND VENTILATING: Materials	in Place.	
Galvanized steel ductwork, insulated, no liner	\$	_ per lb.
Galvanized steel ductwork, insulated, including liner	\$	_ per lb.
12x12 Diffuser	\$	_ per unit
12x12 Return Register	\$	_ per unit
UNIT PRICES - ELECTRICAL WORK: Materials in Place.		
Power outlet (duplex or quadraplex), including outlet boxes and wiring. Receptacles will generally be connected within 10' of adjacent receptacle circuits	\$	ner unit
Single Channel Surface Raceway	*\$	per lin. ft
	т'	

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1.4

1.5

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\$ _ per unit
\$ _ per unit
\$ per unit
\$ per unit
\$ per unit
\$ _ per unit
\$ _ per unit
\$ _ per unit
\$ _ per unit
\$ _ per lin. ft.
\$ _ per Fire Alarm point
\$ _ per unit
\$ _ per lin. ft.
\$ _ per unit
\$ \$ \$ \$ \$ \$

### **END OF SECTION 01151**

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## SECTION 01200 - PROJECT MEETINGS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:
  - 1. Pre-Construction Conference
  - 2. Pre-Installation Conferences
  - 3. Coordination Meetings
  - 4. Progress Meetings
- B. Construction Schedule requirements is specified in another Division 1, Section.

## **1.3 PRE-CONSTRUCTION CONFERENCE**

- A. The Architect will schedule a pre-construction conference and organizational meeting at the Project site or other convenient location no later than fifteen (15) calendar days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees: The Owner, Architect, and their consultants, the Prime Contractor and their superintendent(s), major Subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
- C. Agenda: Discuss items of significance that could effect progress including such topics as:
  - 1. Tentative construction schedule
  - 2. Critical work sequencing
  - 3. Designation of responsible personnel
  - 4. Procedures for processing field decisions and Change Orders
  - 5. Procedures for processing Applications for Payment
  - 6. Distribution of Bid Documents
  - 7. Submittal of Shop Drawings, Product Data, and Samples
  - 8. Preparation of record documents
  - 9. Use of the premises
  - 10. Office, Work, and storage areas

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- 11. Equipment deliveries and priorities
- 12. Safety Procedures
- 13. First Aid
- 14. Security
- 15. Housekeeping
- 16. Working hours

# 1.4 **PRE-INSTALLATION CONFERENCES**

- A. The Prime Contractor to conduct a pre-installation conference at the site before each construction activity that requires coordination with other construction. The installer and representative 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 the Architect of scheduled meeting dates.
  - 1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:
    - a. Bid Documents
    - b. Options
    - c. Related change orders
    - d. Purchases
    - e. Deliveries
    - f. Shop Drawings, product data and quality control samples
    - g. Possible conflicts
    - h. Compatibility problems
    - i. Time schedules
    - j. Weather limitations
    - k. Manufacturer's recommendations
    - I. Compatibility of materials
    - m. Acceptability of substrates
    - n. Temporary facilities
    - o. Space and access limitations
    - p. Governing regulations
    - q. Safety
    - r. Inspection and testing requirements
    - s. Required performance results
    - t. Recording requirements
    - u. Protection
  - 2. Record significant discussions and agreements and disagreements of each conference along with the approved schedule. Distribute the record of the meeting to everyone concerned, promptly, including the Owner, the Architect.
  - 3. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

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## 1.5 COORDINATION MEETINGS

- A. The Contractor for General Construction will conduct project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.
- B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.
- C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

## **1.6 PROGRESS MEETINGS**

- A. Regular Progress Meetings: The Architect will schedule and conduct regular progress meetings as follows:
  - 1. Bi-weekly meeting with the Owner, Architect, Contractor and Subcontractors.
    - a. Weekly meetings between the Contractor and Subcontractors will be the responsibility of the Contractor and the Architect will not attend.
- B. Special Meetings will be conducted as required by the progress of the Work
- C. Location of the meetings: Meetings shall be conducted at a location in the school to be determined by the Owner's Representative.
- D. Attendance: Attendance at Construction Meetings shall be as follows:
  - 1. The Owner shall be in attendance at bi-weekly meetings and at any special meetings as appropriate to the agenda.
  - 2. The Architect and their professional consultants, as needed, at bi-weekly meetings and at any special meetings as appropriate to the agenda.
  - 3. The Contractor at all construction meetings.
  - 4. Subcontractors as appropriate to the agenda.
  - 5. Suppliers as appropriate to the agenda.
  - 6. The Owner's Representative at all construction meetings.
- E. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the project.

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- F. Contractor's Construction Schedule:
  - 1. Review the present and future needs of each entity present, including such items as:
    - a. Interface requirements
    - b. Time
    - c. Sequences
    - d. Deliveries
    - e. Off-site fabrication problems
    - f. Access
    - g. Site utilization
    - h. Temporary facilities and services
    - i. Hours of work
    - j. Hazards and risks
    - k. Housekeeping
    - I. Quality and work standards
    - m. Change orders
    - n. Documentation of information for payment requests
- G. Reporting: No later than three (3) business days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
- H. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.
- I. Attendance by the Contractor is mandatory, whether the meetings are weekly, bi-weekly or at whatever interval is determined by the Architect.
  - 1. Unless given prior approval by the Architect in writing not to attend meetings, Contractor will be fined **\$250.00** for each regularly scheduled meeting for which they are not represented by a person in authority who can speak for and/or make decisions for the Contractor.
  - 2. Fine amounts shall be withheld and deducted from the Contract Sum.

### END OF SECTION 01200

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## SECTION 01400 - MATERIAL TESTING / QUALITY CONTROL SERVICES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for material testing and quality control services.
  - 1. Testing and inspecting services are required to verify compliance with requirements specified or indicated and are the responsibility of the Contractor. These services do not relieve Contractor of responsibility for compliance with the Bid Document requirements.
- B. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 1. Quality Control Services is the responsibility of the Contractor.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Bid Document requirements.
  - 3. Requirements for Contractor to provide quality-control services required by Architect, and the Owner or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
  - 1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections in AIA Document A201 and Section 01200.
  - 2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
  - 3. Division 2 through 26 Sections for specific test and inspection requirements.

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## **1.3 DEFINITIONS**

- A. Quality Control Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect
- C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples.
  - 1. Mockups establish the standard by which the Work will be judged.
- D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

## 1.4 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Bid 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.

## 1.5 **REGULATORY REQUIREMENTS**

A. Copies of Regulations: Obtain copies of referenced regulations which also available in Local Public Libraries.

## 1.6 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. Delegated-Design Submittal: When requirement is indicated in specific technical section and/or when requested by the Architect, in addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed

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by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

- C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Description of test and inspection.
  - 3. Identification of applicable standards.
  - 4. Identification of test and inspection methods.
  - 5. Number of tests and inspections required.
  - 6. Time schedule or time span for tests and inspections.
  - 7. Entity responsible for preforming tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.
- D. 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. Ambient conditions at time of sample taking and testing and inspecting.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Bid Document requirements.
  - 12. Name and signature of laboratory inspector.
  - 13. Recommendations on retesting and reinspecting.
- E. 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.

# 1.7 QUALITY ASSURANCE

A. 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.

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- B. 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.
- C. 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.
- D. 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.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.
- G. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.
  - 1. Preconstruction Testing: Testing agency shall perform preconstruction testing for compliance with specified requirements for performance and test methods.
  - 2. Contractor responsibilities include the following:
    - a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Fabricate and install test assemblies using installers who will perform the same tasks for Project.
    - d. When testing is complete, remove assemblies; do not reuse materials on Project.

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- 3. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and the Owner with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Bid Documents.
- H. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect .
  - 2. Notify Architect seven (7) days in advance of dates and times when mockups will be constructed.
  - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
  - 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
  - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 6. Demolish and remove mockups when directed, unless otherwise indicated.

# 1.8 QUALITY CONTROL

- A. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by Authorities Having Jurisdiction.
  - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
  - 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 Bid Documents are Contractor's responsibility.
    - a. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

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- B. 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.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Bid Documents.
  - 1. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
    - a. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
    - b. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
    - c. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
    - d. Do not release, revoke, alter, or increase requirements of the Bid Documents or approve or accept any portion of the Work.
    - e. Do not perform any duties of Contractor.
  - 2. 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:
    - a. Access to the Work.
    - b. Incidental labor and facilities necessary to facilitate tests and inspections.
    - c. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
    - d. Facilities for storage and field-curing of test samples.
    - e. Delivery of samples to testing agencies.
    - f. Preliminary design mix proposed for use for material mixes that require control by testing agency.
    - g. Security and protection for samples and for testing and inspecting equipment at Project site.
  - 3. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
    - a. Schedule times for tests, inspections, obtaining samples, and similar activities.

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- 4. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Bid Documents. Submit schedule within 30 days of date established for commencement of the Work.
  - a. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

# 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 Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
  - 2. Comply with the Bid Document requirements for Division 1 Section "Cutting and Patching."
  - 3. Protect construction exposed by or for quality-control service activities.
  - 4. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

## END OF SECTION 01400

### SECTION 01410 - REFERENCES AND INDUSTRY STANDARDS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. The Work of this Section applies to all Construction Bid Documents including Drawings, Division 1 - Miscellaneous Requirements Sections, and Specifications Sections included in Part-2 through Part-6.

## 1.2 **DEFINITIONS**

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved:" The term "approved," when used to convey Architect's action on Contractor's submittals, applications, and requests, is limited to Architect's duties and responsibilities.
- C. "Directed:" Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.
- D. "Indicated:" The term "indicated" refers to graphic representations, notes, or schedules on Drawings or to other paragraphs or schedules in Specifications and similar requirements in the Bid Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.
- E. "Regulations:" The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish:" The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install:" The term "install" describes 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:" The term "provide" means to furnish and install, complete and ready for the intended use.
- I. "Installer:" An installer is the 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.

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- J. The term "experienced," when used with an entity, 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, subject to verification by and approval of the Architect.
  - 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 tradespeople of the corresponding generic name.
- K. "Project site(s)" is the 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.

# 1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Bid Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Bid Documents to the extent referenced. Such standards are made a part of the Bid Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Bid Documents, unless otherwise indicated.
- C. Conflicting Requirements: 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.
  - 1. 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.
- D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Bid Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available on request.

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E. Abbreviations and Acronyms for Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Bid Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S.".

## PART 2 - PRODUCTS (Not Used)

# PART 3 - EXECUTION (Not Used)

**END OF SECTION 01410** 

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# SECTION 01455 - CONCRETE IN-SITU RELATIVE HUMIDITY AND pH TESTING

## PART 1 - GENERAL REQUIREMENTS

#### 1.1 SUMMARY

- A. The General Construction Work Contractor shall engage and pay for a testing agency to provide in-situ concrete relative humidity and surface pH testing to existing concrete surfaces specified to be covered with floor coverings or resinous coatings. Testing Agency shall be approved by the Architect / Owner.
- B. Testing to be scheduled no less than 1 nor more than 3 weeks prior to scheduled flooring installation.

## **1.2 RELATED SECTIONS:**

A. Section 09650 - Resilient Flooring

# 1.3 **REFERENCES**

- A. ASTM F-2170-11– Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes
- B. ASTM F-710-11 Standard Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.
- C. ASTM F-1869-11 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

# 1.4 SUBMITTALS

- A. Report all test results in chart form listing test dates, time, depth of test well, in-situ temperature, relative humidity and pH levels.
- B. List test locations on floor plans and show same on 8-1/2 x 11 Table and Location maps. Deliver results in duplicate for distribution to Architect and General Contractor.

# 1.5 QUALITY ASSURANCE

- A. Independent Testing Agency
  - 1. Certified by Test Apparatus Manufacturer for product use.
  - 2. I.C.R.I. (International Concrete Repair Institute) certified, or other agency with verifiable experience.

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- B. Flooring Installers
  - 1. Certified and /or approved by Test Apparatus Manufacturer for product use.
- C. Digital "Reader" and calibrated relative humidity sensors.
  - 1. Factory-calibrated "Smart Sensors" using Touch-n-Sense™ technology.
  - 2. NIST-traceable factory calibration
- D. Wide range pH paper, and distilled or de-ionized water.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURES

- A. Rapid RH® relative humidity and temperature sensor kit as manufactured by Wagner Meters; or approved equal.
- B. pH test paper as manufactured by Micro Essential Laboratory, or approved equal.

# PART 3 - EXECUTION

# 3.1 QUANTIFICATION OF RELATIVE HUMIDITY AT 40% OF CONCRETE THICKNESS

- A. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75± 10°F and 50± 10% relative humidity. When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with the test report.
- B. The number of in-situ relative humidity test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 in the first 1,000 sq. ft. and 1 per each additional 1,000 square feet.
- C. Determine the thickness of the existing concrete slab, typically from construction documents.
- D. Utilizing a roto-hammer drill test holes to a depth equal to 40% of the concrete thickness\*. (i.e.: 2" deep for a 5" thick slab, or 1½" deep for a 4" thick slab). Hole diameter shall not exceed outside diameter of the probe by more than 0.04". Drilling operation must be dry.

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- E. Vacuum and brush all concrete dust from test hole.
- F. Insert a relative humidity probe (sensor) to the full depth of test hole. Place cap over probe.
- G. Permit the test site to acclimate, or equilibrate, for 1 to 2 hours prior to taking relative humidity readings.
- H. Remove the cap, insert the cylindrical reading device, and press button on the device to obtain reading from the in-situ probe.
- I. Read and record temperature and relative humidity at the test site.
  - \* Elevated structural slab (not poured in pans) should be tested at a depth equal to 20% of its thickness.

# 3.2 QUANTIFYING pH LEVEL

- A. At or near the relative humidity test site perform pH test.
  - 1. Place several drops of water onto the concrete surface to form a puddle approximately 1" in diameter.
  - 2. Allow the water to set for approximately 60 seconds.
  - 3. Dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading
- B. Record and report results to the Architect and the General Contractor.

# END OF SECTION 01455

#### **SECTION 01505 - TEMPORARY FACILITIES**

#### 1.1 **RESPONSIBILITIES OF CONTRACTOR**

- A. Contractor is responsible for the following temporary facilities and services:
  - 1. Installation, operation, maintenance and removal of each temporary facility usually considered as its own normal construction activity.
  - 2. Plug in electric cords, extensions cords, supplementary plug in task lighting and special lighting necessary exclusively for their own activities.
  - 3. Their own storage and fabrication sheds.
  - 4. All hoisting requirements for their Work.
  - 5. Collection and disposal of debris, hazardous, unsanitary or other harmful waste material from their operations, on a daily basis to trash receptacles, hoppers, containers, dumpsters, etc. furnished by the Contractor.
    - a. Refer to Section 01050 Alterations, Cutting, Patching and Refinishing Work which identifies the responsible Contractor for the collection and disposal of debris and Section 01524 - Construction Waste Management for additional information.
  - 6. Six foot (6'-0") high site enclosure fence, including maintenance and any gates needed. Provide fence relocations as needed during construction.
  - 7. The secure lockup of their own tools, materials and equipment.
  - 8. Construction aids and miscellaneous services and facilities necessary exclusively for their own construction activities.
  - 9. Temporary storage provisions for Work, including offsite provisions, if required.
  - 10. Containerized bottled drinking water units for their personnel.
  - 11. Fire protection provisions related to Work including fire extinguishers.
  - 12. All personnel safety equipment and provisions for their personnel.
  - 13. Environmental protections.
  - 14. Dust and fume control
  - 15. Tree and plant protection.

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- 16. Other temporary facilities and services stated as their responsibility elsewhere in the Bid Documents.
- 17. Temporary toilets in sufficient quantity to suit project needs and including disposable supplies.

# 1.2 COMPRESSED AIR

A. Contractor shall furnish their own equipment and energy source to provide compressed air required for the completion of work under their Contract.

## **1.3 REMOVAL AND RESTORATION OF TEMPORARY FACILITIES**

A. At the completion of the work prior to final payment, Contractor shall remove temporary facilities and Work which they have been responsible. Refer to Section 01700 for additional requirements.

# 1.4 UTILITY CONSUMPTION

A. The Owner shall be responsible and pay all utility costs for electric and water consumption during the construction period.

## END OF SECTION 01505

# SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

# PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous demolition and construction waste.
  - 2. Recycling nonhazardous demolition and construction waste.
  - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Sections include the following:
  - 1. All of Division 1 and attached Specifications and Drawings that make a part of this Contract.

# 1.3 **DEFINITIONS**

- A. Construction Waste: Building improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to Authorities Having Jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

# 1.4 SUBMITTALS

A. Waste Management Plan: Submit 4 copies of plan within 30 days of date established for the Notice to Proceed.

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- B. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- C. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- D. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- E. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Qualification Data: For refrigerant recovery technician.
- G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

# 1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with hauling and disposal regulations of Authorities Having Jurisdiction.
- B. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 1. Review methods and procedures related to waste management including, but not limited to, the following:
  - 1. Review and discuss waste management plan.
  - 2. Review requirements for documenting quantities of each type of waste and its disposition.
  - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
  - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
  - 5. Review waste management requirements for each trade.

# 1.6 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification, and waste reduction Work plan. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
  - 1. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
  - 2. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
  - 3. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
  - 4. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
  - 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.

# PART 2 - PRODUCTS (NOT USED)

# PART 3 - EXECUTION

# 3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Owner / Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
  - 1. Comply with Division 1 Section "Temporary Facilities" for operation, termination, and removal requirements.

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- B. Training: Train workers, Subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
  - 1. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
  - 2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

# 3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Sale and Donation: Not permitted on Project site.

# 3.3 **RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL**

- A. General: Recycle beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
  - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
    - a. Inspect containers and bins for contamination and remove contaminated materials if found.
  - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 3. Stockpile materials away from construction area.
  - 4. Store components off the ground and protect from the weather.
  - 5. Remove recyclable waste off Owner's property and transport to recycling receiving or processor.

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# 3.4 **RECYCLING CONSTRUCTION WASTE**

- A. Packaging:
  - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
  - 2. Polystyrene Packaging: Separate and bag materials.
  - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
  - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
  - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.

# 3.5 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to Authorities Having Jurisdiction.
  - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials on-site.
- C. Burying: Do not bury waste materials on-site.
- D. Disposal: Transport waste materials off Owner's property and legally dispose of them.
- E. Washing waste materials into sewers or drains is not permitted.

#### END OF SECTION 01524

# SECTION 01600 - PRODUCT REQUIREMENTS

# PART 1 - GENERAL

# 1.1 **RELATED DOCUMENTS**

 A. The Work of this Section applies to all Bid Documents including Drawings, Division 1 - Miscellaneous Requirements Sections, and Specifications Sections included in Part-2 through Part-6.

# 1.2 SUMMARY

- A. Section Includes:
  - 1. General product requirements, including:
    - a. General specification requirements for all products.
    - b. General requirements and procedures for maintenance materials and tools.
  - 2. General requirements for product documentation, including:
    - a. Requirements and procedures for schedule of products.
    - b. General requirements for operation and maintenance data.
  - 3. General procedures for products including:
    - a. Procedures for transportation and handling.
    - b. Procedures for delivery and receiving.
    - c. Procedures for storage.

# PART 2 - PRODUCTS

# 2.1 GENERAL

- A. Components required to be supplied in quantity within a Specification section shall be identical, interchangeable, and made by the same manufacturer.
- B. Do not use products removed from existing construction.

# 2.2 MAINTENANCE MATERIALS AND TOOLS

- A. Maintenance Materials: Parts and materials for repair and maintenance; specific items required are specified in product sections.
  - 1. Provide products and tools which are identical to those used in the Work; if necessary to obtain identical items, order at the same time as products to be installed or tools to be used in the Work.
- B. Package appropriately and label to show type and quantity of contents.

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- C. Deliver, handle, and store in the same manner as products to be installed.
- D. Do not turn over to the Owner until date of substantial completion, unless otherwise approved by the Owner.
- E. Deliver to the Owner; unload.
- F. Obtain receipt prior to final payment.

# PART 3 - EXECUTION

# 3.1 **PRODUCTS**

- A. It is the Contractor's responsibility to select products which comply with the Bid Documents and which are compatible with one another, with existing work, and with products selected by other Contractors.
  - 1. Verify that electrical characteristics of products are compatible with electrical systems; notify Architect of all discrepancies.
  - 2. Where visual matching to an established physical sample is required, the Architect's decision will be final.
- B. Do not use any substitute products which have not been approved in accordance with the requirements of the Bid Documents.
- C. Where the Specification is silent on whether substitutions will be considered, substitutions will be considered only when submitted in accordance with AIA A201 and Section 00800.
- D. Products Specified by Reference Standard: Use any product meeting the Specification. Provisions of reference standards shall not modify the responsibilities of the Owner or Architect as defined in the Bid Documents.
- E. Products Specified by Performance Requirements: Use any product meeting the Specification.
- F. Products Specified to Match a Physical Sample: Use any product that matches; obtain the Architect's approval.
- G. Products Specified by Listing a Brand Name Product(s) made by listed Manufacturer(s) as the "Basis of Design":
  - 1. Pursuant to <u>N.J.S.A.</u> 18A:18A-15(d) indicated basis of design brand name product(s) or equivalent made by one of the manufacturers listed will be acceptable, as determined by the Architect.

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- H. Products Specified by Listing Brand Name Product(s) Accompanied by Language Indicating that Substitutions Are Allowed: Provide a product meeting the Specification; submit substitution request for any brand-name product, that is not listed, in accordance with AIA A201 and Section 00800.
- I. Products Specified by Listing Manufacturer(s): Provide a product meeting the Specification and made by one of the manufacturers listed or an approved equal. Approval of substitutions will be in accordance with AIA A201 and Section 00800.
- J. Unless specified or noted otherwise in the Bid Documents and/or approved submittals, all Work is to be performed in accordance with the respective material Manufacturer's printed installation instruction. Work installed in variance with the Bid Documents, Approved Submittals and Manufacturer's printed installation instructions will be rejected, removed and replaced by the Contractor and at no additional cost to the Owner.

# 3.2 SCHEDULE OF PRODUCTS

- A. Prepare a complete schedule of products used, including the following for each product:
  - 1. Manufacturer's name.
  - 2. Brand or trade name.
  - 3. Model number, if applicable.
  - 4. Reference standard, if more than one is applicable.
  - 5. Arrange products in the schedule by Specification sections; indicate paragraph where specified.
- B. Prepare and submit a preliminary schedule within 15 working days after award of Contract; resubmit when revised; submit final schedule prior to final payment. See additional requirements and milestone dates in Section 01800.
- C. Schedule of products shall not be used to obtain approval of substitute products; make separate request for substitution.

# 3.3 **OPERATION AND MAINTENANCE DATA**

- A. Provide operation and maintenance data as specified in individual product sections.
  - 1. Provide data sufficient for operation and maintenance by Owner without further assistance from the manufacturer.
  - 2. Provide completed data in time for use during Owner instruction.

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- B. Data Required For Products General:
  - 1. Name of manufacturer and product.
  - 2. Name, address, and telephone number of Subcontractor or supplier.
  - 3. Local source of replacements.
  - 4. Local source of replaceable parts and supplies.
- C. Product Data: Where product data is specified for inclusion in operation and maintenance data, provide manufacturer's data sheets marked to indicate specific product and product options actually installed; delete inapplicable data.
- D. Project Record Documents: Provide an additional copy of applicable record documents for inclusion with the operation and maintenance data.
- E. Coordination Drawings: When coordination drawings are prepared, include a copy with the operating and maintenance data.
- F. Custom Manufactured Products: Provide all information needed for reordering.
- G. Finish Materials: Manufacturer's product data, color/texture designations, and manufacturer's instructions for care, cleaning, and maintenance.
- H. Products Exposed to Weather and Products for Moisture Protection: Manufacturer's product data, recommended inspection schedule and procedures, maintenance and repair procedures, and maintenance materials required.
- I. Equipment: Provide at least the following information:
  - 1. Product data giving equipment and function description, with normal operating characteristics and limiting conditions.
  - 2. Starting, operating, and troubleshooting procedures.
  - 3. Cleaning and maintenance requirements and procedures.
  - 4. External finish maintenance requirements.
  - 5. List of maintenance materials required.
  - 6. List of special tools required.
  - 7. Parts list: List all replaceable parts, with ordering data.
  - 8. Recommended quantity of spare parts to be maintained in storage.

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- J. Systems: Provide overall function description, with diagrams, prepared especially for this project.
- K. Form of Data: Prepare data in the form of an instructional manual.
  - 1. Arrange contents logically, using section numbers and sequence of sections indicated on the table of contents of this project manual.
  - 2. When multiple volumes are used, arrange by related subjects; identify contents in cover title.
  - 3. Assemble into 3-ring binders with maximum 2-inch ring size.
    - a. Hardback, cleanable plastic covers.
    - b. Identify each book with title "Operation and Maintenance Instructions" and project name.
    - c. Page size 8-1/2 by 11 inches, maximum.
    - d. Prepare special typewritten data on minimum 20-pound paper.
    - e. Provide tabbed divider for each product and system.
    - f. Drawings: Bind in with other data; provide reinforced binding edge; fold larger Drawings to size of pages.
      - 1) Do not use pockets or loose Drawings.
  - 4. Provide table of contents for each volume listing:
    - a. Name of the project.
    - b. Name, address, telephone number, and contact name of:
      - 1) Architect.
      - 2) Contractor.
    - c. Index of products and systems included in volume.

# 3.4 TRANSPORTATION AND HANDLING

- A. Require supplier to package finished products in a manner which will protect from damage during shipping, handling, and storage.
- B. Transport products by methods which avoid damage.
- C. Deliver in dry, undamaged condition in manufacturer's unopened packaging.
- D. Provide equipment and personnel adequate to handle products by methods which prevent damage.
- E. Provide additional protection during handling where necessary to prevent damage to products and packaging.
- F. Lift large and heavy components at designated lift points only.

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# 3.5 DELIVERY AND RECEIVING

- A. Arrange deliveries of products to allow time for inspection prior to installation.
- B. Coordinate delivery to avoid conflict with the work and to take into account both the conditions at the site and the availability of personnel, handling equipment, and storage space.
- C. Clearly mark partial deliveries to identify contents, to permit easy accumulation of entire delivery, and to facilitate assembly.
- D. Promptly inspect shipments and remedy damage, incorrect quantity, incompleteness, improper or illegible labeling, and noncompliance with requirements of Bid Documents and approved submittals.

## 3.6 STORAGE

- A. No indoor storage areas are available on-site.
- B. General Storage Procedures:
  - 1. Store products immediately on delivery.
  - 2. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible.
  - 3. Store in a manner to prevent damage to the stored products and to the Work.
  - 4. Store moisture-sensitive products in weathertight enclosures.
  - 5. Store indoors if necessary to keep temperature and humidity within ranges required by manufacturer.
  - 6. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.
  - 7. Arrange storage to provide access for inspection and inventory.
  - 8. Periodically inspect and remedy damage and noncompliance with required conditions.
- C. Loose Granular Materials: Store on solid surfaces in well-drained area; prevent mixing with foreign materials.
- D. Exterior Storage:
  - 1. Cover products subject to weather damage with impervious sheet covering; provide ventilation to avoid condensation.

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- 2. Provide surface drainage to prevent runoff or ponded water from damaging stored products.
- 3. Prevent damage and contamination from refuse and chemically injurious materials and liquids.
- 4. Store fabricated products on substantial platforms, blocking, or skids above the ground, sloped to drain.

# END OF SECTION 01600

#### SECTION 01700 - PROJECT CLOSEOUT DOCUMENTS AND PROCEDURES

#### PART 1 - GENERAL

## 1.1 **RELATED DOCUMENTS**

A. The Work of this Section applies to all Bid Documents including Drawings, Specifications, Division 1 - Miscellaneous Requirements Sections and Specification Sections included in Part-2 through Part-6.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Maintenance of Project Record Documents,
  - 2. Record drawings, including As-Built Drawings,
  - 3. Record project manual (Specifications),
  - 4. Operation and Maintenance Manuals,
  - 5. Warranties,
  - 6. Extra Materials,
  - 7. Submittals required prior to requesting for determining dates of substantial and final completion, and also prior to release of final payment(s),
  - 8. Transmittal of Closeout Project Documents to the Owner,
  - 9. Instructions of Owner's personnel,
  - 10. Final Cleaning.

# B. GENERAL REQUIREMENTS

- 1. All submittals shall indicate reference to the appropriate <u>Architect's Project</u> <u>Number.</u>
- C. As-Built Drawings:
  - 1. Full-size paper set.
  - 2. Two (2) Flash Drives.

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## 1.3 MAINTENANCE OF PROJECT RECORD DOCUMENTS

- A. Do not use record documents of any type for construction purposes.
- B. Maintain record documents in a secure location at the site while providing for access by the Contractor and the Architect during normal working hours; store in a fire-resistive room or container outside of normal working hours.
- C. Record information as soon as possible after it is obtained.
- D. Assign a person or persons responsible for maintaining record documents.
- E. Record the following types of information on all applicable record documents:
  - 1. Dimensional changes.
  - 2. New and revised details.
  - 3. Actual routing of piping and conduit.
  - 4. Revisions to electrical circuits.
  - 5. Actual equipment locations.
  - 6. Sizes and routing of ducts.
  - 7. Locations of utilities concealed in construction.
  - 8. Particulars on concealed products which will not be easy to identify later.
  - 9. Changes made by modifications to the Contract; note identification numbers if applicable.
  - 10. New information which may be useful to the Owner, but which was not shown in either the Bid Documents or submittals.

# 1.4 **RECORD AND AS-BUILT DRAWINGS**

- A. During the progress of the installation, the Contractor shall keep a careful record of all changes and variations in the arrangement of their Work from the layout shown on the Contract Drawings in order that the Owner may be provided with a complete set of all plans (As-Builts) showing the Work as actually installed.
  - 1. The Contractor shall maintain complete two (2) sets of opaque prints of the Contract Drawings, marked to show changes which occur due to their Work.

- 2. Where the actual Work differs from that shown on the Drawings, mark this set to show the actual Work.
- 3. Mark location of concealed items before they are covered by other Work.
- 4. Mark either record Contract Drawings or shop drawings, whichever are best suited to show the change.
- 5. Where changes are marked on record shop drawings, mark cross-reference on the applicable Contract Drawing.
- 6. When the Contractor is required by a provision of a modification to prepare a new Drawing, rather than to revise existing Drawings, obtain instructions from the Architect as to the Drawing scale and information required.
- 7. Keep Drawings in labeled, bound sets.
  - a. Mark with red pencil.
  - b. Mark work of separate Contracts with different colors of pencils.
- 8. Incorporate new Drawings into existing sets as they are issued.
- 9. Where record Drawings are also required as part of operation and maintenance data submittals, make copies from the original record Drawing set.
- 10. As-Built Drawing Format to be submitted to the Architect:
  - a. One (1) complete, legible full-size paper (hard copy) As-Built Drawing set with the following information on each page:
    - 1) Note: "As-Built" drawing,
    - 2) Contractor's Firm name,
    - 3) Date.
  - b. Two (2) copies, pdf format CD-Rom, scanned As-Built Drawings of the hard copy furnished to the Owner (indicated above) shall be furnished to the Owner and the Architect and as directed by the Architect.
- 11. Mechanical/ Electrical As-Built Drawings must be submitted to the Engineer with a copy of the transmittal to the Architect. Approval must be obtained before issuing Final Certificate of Payment.
- B. Record drawings shall be provided for **all work** including but not limited to the following:
  - 1. General Construction Work
  - 2. Plumbing and Drainage Work
  - 3. HVACR Work
  - 4. Electrical Work

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## 1.5 **PROJECT SPECIFICATION MANUAL**

- A. The Contractor shall maintain a complete copy of the project Specification manual, marked to show changes which occur due to their Work.
- B. Where the actual Work differs from that shown in the project manual, mark the record copy to show the actual Work.
  - 1. Include a copy of each Addendum and modification to the Contract.
  - 2. In addition to the types of information required on all record documents, record the following types of information:
    - a. Product options taken, when the Specification allows more than one.
    - b. Product substitutions.
    - c. Proprietary name and model number of actual products furnished, for each product, material, and item of equipment specified.
    - d. Name of the supplier and installer, for each product for which neither a product data submittal nor a maintenance data submittal was specified.

# 1.6 **OPERATION AND MAINTENANCE MANUALS**

- A. Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:
  - 1. Operation Data:
    - a. Emergency instructions and procedures.
    - b. System, subsystem, and equipment descriptions, including operating standards.
    - c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
    - d. Description of controls and sequence of operations.
    - e. Piping diagrams.
  - 2. Maintenance Data:
    - a. Manufacturer's information, including list of spare parts.
    - b. Name, address, and telephone number of Installer or supplier.
    - c. Maintenance procedures.
    - d. Maintenance and service schedules for preventive and routine maintenance.
    - e. Maintenance record forms.
    - f. Sources of spare parts and maintenance materials.
    - g. Copies of maintenance service agreements.
    - h. Copies of warranties and bonds.

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- B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.
- C. Operation and Maintenance Manuals must be submitted to the appropriate Engineer with a copy of the transmittal to the Architect. Approval must be obtained before issuing Final Certificate of Payment.
  - 1. Contractors shall submit electronic version of the MEP/FP O&M manuals for review by the MEP/FP Consultant. \*Paper copies should not be submitted as part of the MEP/FP review process.

# 1.7 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 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.
  - 4. Warranty manual must be submitted to the Architect for review. Architect's approval must be obtained before issuing final payment.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

# 1.8 SUBMITTAL REQUIREMENTS - 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.

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- 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 and digital images on CD Rom, damage or settlement 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. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
- 8. Complete startup testing of systems.
- 9. Submit test/adjust/balance records.
- 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
- 11. Advise Owner of changeover in heat and other utilities.
- 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- 13. Complete final cleaning requirements, including touch-up painting.
- 14. 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.

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- 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.

# 1.9 SUBMITTAL REQUIREMENTS - 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 the requirements of the Bid Documents.
  - 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 and signed by the Contractor.
  - 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. Submit demonstration and training videotapes. Provide statement signed by Owner's Representatives stating that they have received the required training.
- 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. <u>The cost of additional inspections required by the Architect or their consultants due to Contractor's failure to complete the punch list will be paid by the Contractor and will be deducted from the Contractor's final payment.</u>
- C. The Contractor is required to obtain all final releases from governmental and regulatory Agencies Having Jurisdiction over the project with the assistance from the Architect / Engineer and Owner (if required).

# 1.10 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list to the Architect. Include name and identification of each space and area affected by construction operations for

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incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

- 1. Organize list of spaces in sequential order, as applicable.
- 2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
- 3. Include the following information at the top of each page:
  - a. Project name.
  - b. Date.
  - c. Name of Architect.
  - d. Name of Contractor.
  - e. Page number.

# 1.11 **PROJECT RECORD DOCUMENTS**

- A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.
- B. Record Drawings: Maintain and submit one set of blue or black-line white prints of Contract Drawings and Shop Drawings.
  - 1. 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 cannot be readily identified and recorded later.
    - b. Accurately record information in an understandable drawing technique.
    - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
    - d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
  - 2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
  - 3. Mark important additional information that was either shown schematically or omitted from original Drawings.
  - 4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.

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- 5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.
- C. Record Specifications: Submit one copy of Project's Specifications, including addenda and Contract modifications. Mark copy 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. Note related Change Orders, Record Drawings and Product Data, where applicable.
- D. Record Product Data: Submit one copy of each Product Data submittal. Mark one set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.
  - 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 Drawings, and Record Specifications, where applicable.
- E. Miscellaneous Record Submittals: 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.

# 1.12 DEMONSTRATION AND TRAINING

- A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Provide instructors experienced in operation and maintenance procedures.
  - 2. Provide instruction at mutually agreed-on times.

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- 3. Schedule training with Owner, through Architect, with at least seven calendar days advance notice.
- 4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.
- B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification sections. For each training module, develop a learning objective and teaching outline. Include instruction for the following:
  - 1. System design and operational philosophy.
  - 2. Review of documentation.
  - 3. Operations.
  - 4. Adjustments.
  - 5. Troubleshooting.
  - 6. Maintenance.
  - 7. Repair.

# 1.13 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.
  - 1. Refer to other Division 1 specification sections for additional cleaning as required and where applicable.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building 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. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid

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disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

- f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- g. Clean transparent materials, including glass in doors. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish glass, taking care not to scratch surfaces.
- h. Remove labels that are not permanent.
- i. 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.
  - (1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
- j. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- k. Replace parts subject to unusual operating conditions.
- I. <u>Plumbing Work Subcontractor</u> shall clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- m. <u>Heating, Ventilating Air Conditioning Work and Refrigeration</u> <u>Subcontractor</u> shall replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - 1) Clean ducts, blowers, and coils if units were operated without filters during construction.
- n. <u>Electrical Work Subcontractor</u> shall clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- o. Leave Project clean and ready for occupancy.
- p. 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.

# 1.14 TRANSMITTAL TO OWNER

- A. Collect, organize, label, and package ready for reference.
  - 1. Provide cardboard file boxes for submittals.
  - 2. Provide cardboard Drawing tubes with end caps for transparencies.
  - 3. Bind print sets with durable paper covers.

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- 4. Label each document (and each sheet of Drawings) with "PROJECT RECORD DOCUMENTS This document has been prepared using information furnished by \_\_\_\_\_\_" [insert the Contractor's name], and the date of preparation.
- B. Submit to the Architect for transmittal to the Owner, unless otherwise indicated.

# 1.15 **REMOVE TEMPORARY FACILITIES**

- A. At the completion of the Work prior to final payment, remove all temporary facilities entirely from the site, including, but not limited to, the following:
  - 1. Trailers, temporary toilets, temporary enclosures, dust barriers and other temporary protection devices.

## 1.16 SUBMITTALS REQUIRED PRIOR TO FINAL PAYMENT

- A. Contractor must satisfy all requirements of Sections 01700 and 01900 prior to submitting for Final Payment.
- B. A closeout checklist will be provided to the Contractor when are substantially complete. The Contractor is instructed to mark each submittal with the corresponding item number on the checklist. All warranties must have the Owner Name, Project Name, Architect Project Number and Warranty Periods. If all documents are not received in this format, the submittal will be rejected and the Contractor will be instructed to pick these documents up at the Architect's office for correction.
- C. Submittals required prior to final payment shall be in accordance with "Checklist" include, but are not limited to, the following items:
  - 1. Completed Operations Insurance Certificate ACORD Form.
    - a. In accordance with AIA A101- Exhibit A:
      - § A.3.1.3 Additional Insured Obligations. To the fullest extent 1) permitted by law, the Contractor (and all Subcontractors) shall cause the commercial general liability coverage 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 for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided under Article A.3.2 Contractor's Required Insurance. The Products and Completed Operations insurance shall be maintained for five (5) years after final

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payment or the then current applicable statute of repose. A "per project endorsement" shall be included, so that the general aggregate limit applies solely to the Project that is the subject of this Contract.

- 2. Affidavit of Payment of Debts and Claims AIA Document G706.
- 3. Affidavit of Release of Liens AIA Document G706A.
- 4. Consent of Surety Company to Final Payment AIA Document G707.
- 5. Certification of Wages in accordance with New Jersey Prevailing Wage Act, <u>N.J.S.A.</u> 34:11-56.25 et seq.
- 6. 10% one year Maintenance Bond on the form provided in this Specification.
- 7. Manufacturers' product warranties, Special written guarantees and warranties, maintenance warranty, etc. in accordance with Section 01900, various Specification sections and the Table of Contents of the Project Manual. This is in addition to the one-year guarantee covered by the Maintenance Bond and in addition to the Contractor's one-year guarantee.
  - a. Guarantee shall be signed and sealed by Officer of the Contracting Firm and shall be notarized.
- 8. Project Record Drawings, (As-Built Drawings), Record Specifications, Record Product Data, and Miscellaneous Record Submittals.
  - a. Note: As-Built Drawings shall be submitted to the appropriate Engineer(s)/ Architect.
- 9. Operation and Maintenance Manuals and Instructions.
  - a. Note: Operation and Maintenance Manuals shall be submitted to the appropriate Engineer(s) / Architect.
- 10. Balancing Reports for Heating, Ventilating, Air Conditioning and Refrigeration systems.
- 11. Certificate of Occupancy / Copies of all Building Department inspection approvals.
- 12. In accordance with requirements of <u>N.J.S.A</u>. 52:32-44. Contractor must submit accurate list of all Subcontractors and suppliers. <u>Contractor must provide a certification</u> that all proofs of business registration for all Subcontractors and suppliers are maintained in their file.
- 13. All approvals and final releases from governmental and regulatory agencies have jurisdiction including, but not limited to: NJDCA, Local Construction Department, NJDEP, etc., as required.

## END OF SECTION 01700

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# **CLOSEOUT CHECKLIST**

Owner			
Title			
Project #		Contract:	
Contractor			
Substantial	Completion Date:	Updated:	
Refer to Specification Sections 01700 and 01900 for closeout requirements.			
Item No.	Documents & Warranties Required For Closeout	Status	
	Letter on Contractor's letterhead stating date of substantial		
1	completion and requesting punch list review to Architect & Engineer		
2	Completed Operations Insurance Certificate - ACORD Form		
3	Completed Operation Insurance Statement		
4	AIA Document G704 Certificate of Substantial Completion		
5	Final Punch list signed and dated indicating completion of all work		
6	Ala Document G706 Affidavit of Payment of Debts & Claims		
/	AIA Document G706A Affidavit of Release of Liens		
8	AIA Document G707 Consent of Surety to Final Payment		
0	Certification that all wages have been paid - NJ Prevailing wage Act,		
9	N.J.S.A. 34.11-30.23		
10	on contractor relienced state an outstanding certified payron and		
10	10% 1 year Maintenance Bond, must be on form provided in spec		
11	hook		
12	1-Vear Contractor's Guarantee Covered by Maintenance Bond		
12	Submit accurate list of all subcontractors and suppliers and provide		
	a certification that all proofs of business registration for all		
13	subcontractors and suppliers are maintained on his/her file		
14	Certificate of Approval/Acceptance		
	All approvals and final releases from governmental and regulatory		
	agencies have jurisdiction including, but not limited to: NJDCA, Local		
15	Construction Department, NJDEP, etc., as required.		
_	Record Project Manual (spec book) indicating changes or company		
16	letter stating no changes.		
	Operation Instructions & Maintenance Manuals		
	(1 in 3-ring binder with table of contents and divider tabs and provide		
17	thumb drive with same)		
	Record Drawings. Indicate As-Built drawings with company name,		
18	address and date (1 Paper Set & 2 Thumb Drives)		
19	All shop drawing on a flash drive		
20	Balancing & Testing Reports (HVAC)		
21	Fire Alarm Certification (ELECTRICAL)		
22	Final Punch list signed & dated indicating completion of all work		
23	Final Payment Application w/Board Voucer/Invoice (2 copies)		
	Warranties - Refer to Section 01900 - organize into sequence based		
	on Project Manual table of contents.		

# SECTION 01800 - TIME OF COMPLETION AND LIQUIDATED DAMAGES

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. This section describes the requirements for completion of interim milestone events and final completion of all work required by the Bid Documents.
- B. Related Sections:
  - 1. Items of Work attached to the "Certificate of Substantial Completion" and establishing "Final Completion Time" as per Section 00800.
- C. This section also establishes the relation of liquidated damages for failure to complete the interim milestone events or final completion requirements within the time requirements stated herein.
- D. The building (or part of the building) will be occupied at all times. The Contractor shall maintain heat, electric, fire safety systems and emergency egress paths, control dust and water infiltration at all times.

## **1.2 TIME FOR COMPLETION**

- A. It is understood that the Contractor has mutual responsibility to complete its Work in sequence with the Work of the other Contractor(s) and to allow the other Contractor(s) access to the Work site so that they may complete their Work within the times established.
- B. Completion of the Contract Work by the Contractor shall be time of the essence.
- C. The Contractor shall Work overtime, additional shifts, weekends or holidays to complete the Work on time with no additional cost to the Owner.
  - 1. Scarce resources will be no excuse for not completing the work on time.
  - 2 No work may take place during the school day in any occupied area. All work, in occupied areas, shall be performed on second shift (3:00 PM - 11:00 PM). Refer to the Milestones (below in subparagraph 1.5) for 2<sup>nd</sup> shift work durations. Only limited / selective work is permitted. Contractor must review proposed work activities and have approval of Owner and Architect prior to proceeding.
  - 3. Work may take place during regular shift and second shift (7:00 AM 10:00 PM). Refer to the Milestones (below in subparagraph 1.5) for 1<sup>st</sup> and 2<sup>nd</sup> shift work durations. The Contractor is required to review and coordinate all work activities with the Architect and School Facilities Director prior to commencing with the work.

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- a. Contractor to review permitted work hours to comply with the local "Noise Ordinance".
- 4. Contractor is required to include the cost of any premium time, second shift and weekend work which may be required in their bid to complete the Work within the indicated milestone dates.
- 5. All work must be scheduled and coordinated with Owner's schedule.
- 6. All occupied spaces must be returned to normal operating condition by next school day.
- D. Substantial and final completion of the Work shall include but is not limited to final inspection and acceptance by the Local Building Officials.

# **1.3 SEQUENCE OF CONSTRUCTION**

- A. In order to allow the Prime Contractor and Subcontractor(s) to understand the requirements of the Project, the following general sequence of construction Work will be followed:
  - 1. Generally, the General Construction Contractor is to schedule, sequence and coordinate the Work with Subcontractors, as required, to logically progress the Work, meeting the overall design intent, construction quality and time of completion. Schedule inspections and obtain required approvals of all stages of the Work as required by the Local Construction Officials.
  - 2. Proper scheduling of the Work includes timely sequencing, preparation, review and approval by the Prime Contractor and **submission of requisite technical and other project submittals and shop drawings** to the Architect / Engineer(s) for approval to advance the proper, logical progression of the Work.
  - 3. After mobilization and securing the work site, the General Construction Work Contractor is to perform selective demolition of existing general building construction, layout and coordinate the proposed new building construction with existing construction to remain, as noted on the Construction Drawings.
    - a. Apply for and obtain demolition permit to allow commencement of the Work while permit applications for new Construction are under review by the Construction Official.
  - 4. The Prime Contractor is responsible to coordinate their Work with the general construction for installation of Plumbing, Drainage & Gas Fittings, HVAC and Electrical rough-in construction Work below and in floor slabs, interior and exterior walls.
  - 5. Progress the Work of all Trades towards completion, as required, by the Bid Documents to obtain **Substantial Completion** including, inspection and testing

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by local construction officials, commissioning, testing and balancing of the HVAC, Automatic Temperature Controls, Plumbing and Electrical Work to obtain the Certificate of Occupancy.

- 6. Provide written formal notification of **Substantial Completion** to the Architect / Engineer and request Punch-List Observations.
- 7. Complete proper preparation, review and approval by the Prime Contractor and submission of all Close-out Documents, Operation and Maintenance Manuals, Asbuilt surveys and Drawings to the Architect / Engineer(s) within Contract time required to achieve **Final Completion**.

# 1.5 PROJECT CONTRACT MILESTONE DATES

# A. TIME OF COMPLETION

# 1. Milestone No. 1

- a. Sign Contract, no later than **twenty (20)** calendar days, Sundays and Holiday's excepted, from **Notice of Award;** on or about **December 18**, **2024.**
- b. Contractor submits Bonds and Insurance ten (10) calendar days from Notice of Award, Sundays and holidays excepted.
- c. Notice to Proceed shall be within three (3) business days of date of signing Contract; on or about January 15, 2025.

# 2. Milestone No. 2

a. **Time Critical submittals** for special equipment, fixtures, etc. shall be submitted within **twenty (20) calendar days from Notice to Proceed.** 

# 3. Milestone No. 3

a. Submission of all remaining technical shop drawing submittals shall be submitted within **thirty (30) calendar days from Notice to Proceed.** 

# 4. Milestone No. 4A

a. Physical Work can commence on 4/21/2025 at PK-1, MC-1, PK-1A, PK-1B, TR-1A, and TR-1B. Spaces will be unoccupied.

# 5. Milestone No. 4B

a. From 4/21/2025 to 4/25/2025, Work can take place during 1st and 2nd shift during the school's Spring Recess at PK-1, MC-1, PK-1A, PK-1B, TR-1A, and TR-1B.

# 6. Milestone No. 4C

a. From 4/28/2025 to 6/20/2025, Work shall take place during 2nd shift only at PK-1, MC-1, PK-1A, PK-1B, TR-1A, and TR-1B.

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# 7. Milestone No. 4D

a. Starting 6/23/2025, all work can take place during 1st and 2nd shift at all areas through Substantial Completion.

# 8. Milestone No. 5

- a. Substantial Completion of the entire project shall be on or before 213 Calendar Days from the Notice to Proceed, August 15, 2025.
- b. Liquidated Damages <u>\$2,000.00</u> / Calendar day of delay.
- 9. Milestone No. 6
  - a. Final Completion of all Work including punch list items and closeout documents, no later than **31 Calendar Days from Substantial Completion**, **September 15, 2025.**
  - b. Liquidated Damages <u>\$2,000.00</u> / Calendar day of delay.

# 1.6 LIQUIDATED AND OTHER DAMAGES

- A. By bidding the Project, the Contractor is accepting that the time allotted for the completion of Work is reasonable. Completion of Work on or about these milestones are prerequisites for the coordinated Work of all Contractors. When the Owner will suffer financial loss and/or extra cost if a milestone task is not completed within the allotted time, the Contractor responsible for the delay in achievement of each milestone, as determined by the Owner's Project Manager and the Architect, shall pay to the Owner a fixed, agreed sum as liquidated damages for each calendar day of delay until the milestone task is substantially completed.
- B. The Liquidated Damages set for above shall be in addition to other consequential losses or damages the Owner may incur by reason of such delay, such as, but not limited to, the cost of additional architectural and engineering, independent third party inspection and other services resulting from the delay, additional costs to the Owner for payments to other Contractors resulting from delay.
- C. Liquidated Damages are fixed and agreed upon by and between the Contractor and the Owner because of the impracticality and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, and said amounts shall be retained from time to time by the Owner for the current periodical payments.
  - 1. The Liquidated Damages set for above are intended to compensate Owner for loss of use during the period of delay, for other delay during construction which may result further delay in substantial and/or final completion dates and for any acceleration costs by other Contractors to recover the defaulting Contractor's delay.
  - 2. In no way shall costs of Liquidated Damages be construed as a penalty to the Contractor.

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- D. The Owner shall have the right to deduct the total amount any Liquidated Damages for which the Contractor may be liable from any monies otherwise due the Contractor, including any retainage under control of the Owner.
- E. The Surety providing the Performance Bond, furnished by the Contractor, will be liable for Liquidated Damages assessed against the Contractor, to the extent that the Contractor shall not make settlement thereof with the Owner.
- F. The Contractor agrees that in the event the Owner is required to incur or advance any additional necessary and reasonable costs (including but not limited to Architect, Attorney or other fees related expenses), as a result of the failure of the Contractor to perform any obligation of this Contract or to perform its obligations in a timely manner, as required, by the Bid Documents, the Contractor agrees that such additional necessary and reasonable costs shall be borne by the Contractor and may be deducted by the Owner from any payment due the Contractor.
- G. In accordance with <u>N.J.S.A</u>. 18A:18A-19, the Owner shall deduct from the Contract Price, for any wages paid by the Owner to any inspector or inspectors necessarily employed by for the Work of this project, for any number of days in excess of the number of days or indicated dates allowed in milestones above. Such sums shall be part of the Liquidated Damages indicated herein after.

# **END OF SECTION 01800**

# SECTION 01900 - GUARANTEES AND WARRANTIES

# PART 1 - GENERAL

## 1.1 CONTRACT

- A. Period for all guarantees and warranties shall commence at date of substantial completion for the entire project, as determined by the Architect.
- B. The Contractor's guarantee on all work, covered by Maintenance Bond....One (1) Yr.
  - 1. The Maintenance Bond shall represent a continuing obligation of the Prime Contractor and their Subcontractor(s) to repair/replace defective materials and/or labor of products installed in the project for **one (1) year** from the date of Substantial Completion.
- C. Provide all required warranties indicated in specification sections which include but not limited to the following:

## **1.2 GENERAL CONSTRUCTION WORK**

- A. Self-Drying Finishing Underlayment as specified in Section 03450. (Trowel)
  - 1. Special Project Warranty: Submit a written warranty signed by the manufacturer, the contractor, and the installer, guaranteeing to correct failures in materials and workmanship which occur within the warranty period, including those attributable to abnormal aging, without reducing or otherwise limiting any other rights to correction which the Owner may have under the contract documents.
    - a. The warranty shall include responsibility for removing and replacing other work as necessary to accomplish repairs or replacement of materials covered by the warranty.
      - 1) Warranty period: Minimum **two (2) years** after date of substantial completion.
- B. Unit Masonry Work as specified in Section 04200.
  - 1. The Contractor shall warrant the exterior walls to be free from leakage due to any natural cause for a period of **five (5) years** from date of final acceptance of the building and they shall, within such period at their own expense, upon written notification from the Owner, pursue such remedial measures as may be necessary to correct any condition of leakage and damage incidental thereto that may develop. The Contractor in signing this Contract accepts the above conditions. In so doing, they also agrees either that the materials and methods specified herein are such as to insure the results required or that they will, at no additional expense, furnish such additional or alternative items of labor and materials (or both) as may be necessary to accomplish the stated intent of the Contract.

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- 2. Stainless Steel Fabric Flashing:
  - a. Manufacturer shall warrant flexible flashing material for **life of the wall**.
- C. Solid Polymer Fabrications as specified in Section 06650.
  - 1. Provide manufacturer's warranty against defects in materials, fabrication and installation, excluding damages caused by physical or chemical abuse or excessive heat. Warranty shall provide for replacement or repair of material and labor for a period of **ten (10) years**, beginning at Date of Substantial Completion.
    - a. For fabrications with installed warranty coverage, identify by affixing manufacturer's fabrication/installation source plate.
- D. Fluid Applied Air / Vapor Barriers as specified in Section 07270.
  - 1. Manufacturer's Single Source Warranty:
    - a. Fluid Applied Air and Vapor Barrier:
      - 1) Product Warranty: Manufacturer warrants the material against product defect for a period of **five (5) years** from date of purchase.
- E. Agreement to Maintain Roofing
  - 1. Roofing Contractor shall agree to maintain the roof systems and related roof sheet metal work in a weathertight and watertight condition for a period of **two (2) years** starting from the date of Owner's acceptance in accordance with special Maintenance Contract outlined herein.
  - 2. During the Maintenance Period, the Roofing Contractor agrees that within 24 hours of receipt of notice from the Owner they will inspect and make immediate emergency repairs to defects or to leaks in the roof systems and related flashing work. They further agrees that within a reasonable time, they will restore the affected items to the standard of the original specifications. All emergency and permanent work during the life of the agreements to maintain the roof systems will be done without cost to the Owner, except in the event it is determined that such leaks were caused by abuse, lightning, hurricanes, tornado, hailstorm, other unusual climatic phenomena of the elements, or failure of related work (except related roof sheet metal work included under the Agreement) installed by other parties.
  - 3. Agreement to maintain roofing system shall be in a written form acceptable to the Owner.
- F. Flashing, Sheetmetal and Roof Accessories as specified in Section 07600.
  - 1. Warrant Fluoropolymer coating to remain free, under various atmospheric conditions, from peeling, checking, or cracking, and chalking in excess of numerical rating of 8 when measured in accordance with ASTM D659-86, or fading in excess of 5 N.B.S. units during warranty period.

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- a. The Warranty period shall be **twenty (20) years** which starts on the approved date of Substantial Completion.
- G. Joint Sealer Assemblies as specified in Section 07900.
  - Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
     a. Warranty Period: Five (5) years from date of Substantial Completion.
  - 2. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing 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.
    - a. Warranty Period: Five (5) years from date of Substantial Completion.
    - b. Submit two (2) copies of written guarantee for all sealant work of this section signed by the Contractor and the sealant manufacturer for a period of **five (5) years** from the date of acceptance by the Owner.
    - c. Guarantee shall further state that all exterior sealant will be guaranteed against:
      1) Adhesive or cohesive failure in joints where movement is under maximum 25% extension or compression.
      - 2) Any crazing greater than 3 mils in depth developing on surface of material.
- H. Wood Doors as specified in Section 08211..... Life of Installation.
  - 1. Submit written agreement in door manufacturer's standard form signed by the manufacturer and contractor, agreeing to repair or replace defective doors which have warped (bow, cup or twist) or which show photographing of construction below its face veneers, or do not conform to tolerance limitations of NWMA.
  - 2. The warranty shall also include refinishing and reinstallation as may be required due to repair or replacement of defective doors.
- I. Finish Hardware as specified in Section 08700.
- J. Aluminum Windows as specified in Section 08520.
  - 1. Window: **Ten (10) years** from date of Substantial Completion.
  - 2. Painted Metal Finishes:
    - a. **Ten (10) years** from date of Substantial Completion for AAMA 2604 High Performance Finishes.
- K. Glass and Glazing as specified in Section 08800.
  - 1. Manufacturer's Special Warranty on Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass manufacturer agreeing to furnish

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replacements for those 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.

- a. Warranty Period: **Ten (10) years** from date of Substantial Completion.
- 2. Manufacturer's Limited Warranty on Fire-Rated / Impact Glazing: Written warranty, made out to the Owner and signed by manufacturer, warrants only that the product will be free of manufacturing defects resulting in material obstruction through the glass area and/or edge separation and changes in properties of the interlayer for a period of **five (5) years** from the date of purchase, provided the Products have been properly shipped, stored, handled, installed and maintained.
  - a. Limitation of Remedy Inspection: The remedy for product proved to be defective under the terms of this warranty is limited to shipment of replacement product. With respect to all claims under this warranty, the Manufacturer shall have the right to inspect any and all products alleged to be defective.
- L. Tile as specified in Section 09300.
  - 1. Limited Warranty:
    - a. Manufacturer warrants that manufactured products will be free from defect for a period of **one (1) year** from date of purchase.
      - 1) Defect is defined as a shortfall in the product to perform to manufacturer's specifications as disclosed in product literature, within industry allowable tolerances as set forth in standard, national industry protocols.
      - 2) Manufacturer provides detailed information in its product literature regarding appropriate tile and stone applications. Failure to comply with recommended applications voids this warranty.
  - 2. Epoxy Grout:
    - a. DS 230.10: **Ten (10) Year** System Warranty.
- M. Acoustical Ceilings and Suspension System as specified in Section 09510.
  - 1. Special Manufacturer's Warranty: Written warranty, signed by the ceiling manufacturer agreeing to furnish ceiling materials and replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 2. Warranty Period: **Thirty (30) year** System Performance Guarantee against visible sag, Mold/Mildew and Bacteria Growth.
- N. Resilient Flooring as specified in Section 09650.
  - 1. Vinyl Composition Tile:
    - a. Special Warranty Manufacturer warrants its regular (first quality) commercial floor products to be free from manufacturing defects for **five (5) years** from date of purchase.

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- 1) <u>Within One Year</u>: If a defect covered by this warranty is reported to the manufacturer in writing within one year of purchase, Manufacturer will supply new material of the same or similar grade sufficient to repair or replace the defective material. Manufacturer will also pay reasonable labor costs.
- 2) <u>Within Two Years</u>: If a defect covered by this warranty is reported to the manufacturer in writing after one year but within two years of purchase, Manufacturer will supply new material of the same or similar grade sufficient to repair or replace the defective material. Manufacturer will also pay fifty (50%) percent of reasonable labor costs.
- 3) <u>After Two Years</u>: If a defect covered by this warranty is reported to the manufacturer in writing after two years but within five years of purchase, Manufacturer will supply new material of the same or similar grade sufficient to repair or replace the defective material. Manufacturer will not pay for labor costs.
- 4) Manufacturer does not warrant the installers' workmanship. Workmanship errors should be addressed to the contractor who installed the floor.
- 2. Wall Base: Five (5) year Limited Commercial warranty.
- O. Dry Marker Boards / Exhibition Boards as specified in Section 10100.
  - 1. Submit a "Life of Building" warranty, stating that under normal usage and maintenance, and when installed in accordance with manufacturer's instructions and recommendations, porcelain enamel steel markerboard and chalkboard writing surfaces are guaranteed for the Life of the Building. Guarantee covers replacement of defective boards, but does not include cost of removal or reinstallation.
  - 2. Submit a standard warranty, stating that when installed in accordance with manufacturer's instructions and recommendations, exhibition boards are guaranteed for **one (1) year** against defects in materials and workmanship. Guarantee does not cover normal wear and tear, improper handling, any misuse, or any defects caused by vandalism or subsequent abuse. Guarantee covers replacement of defective material, but does not include cost of removal or reinstallation.
  - 3. Writing Surface Warranty Period: Lifetime of the building commencing on the Date of Substantial Completion.
- P. Toilet and Bath Accessories as specified in Section 10800.
  - 1. Washroom Accessories: Warranty is limited to replacing or repairing, at the manufacturer's option, transportation charges prepaid by the purchaser, any washroom accessory unit or part thereof which their inspection shall show to have been defective within the limitation of the warranty. Period of warranty is measured from the date of their invoice as follows:
    - a. Complete unit (except mirrors) **One (1) year**.

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- b. Stainless Steel Mirror Frames Fifteen (15) years against corrosion.
- c. Tempered Glass Mirrors Five (5) years against silver spoilage.
- d. Polished #8 Architectural Grade Finish on 304 Series Stainless Steel **One (1)** year against corrosion.
- e. Bright Annealed Finish on 430 Series Stainless Steel One (1) year against corrosion.

\* Warranty <u>does not</u> cover installation labor charges and does not apply to any units which have been damaged by accident, abuse, improper installation, improper maintenance, or altered in any way.

- Q. Infant Changing Table as specified in Section 10830.
  - 1. Warranty: Submit manufacturer's standard warranty on all parts and installation.
    - a. Unit shall be backed by manufacturer's **five (5) year limited** warranty on materials and workmanship and include a provision for replacement caused by vandalism from date of substantial completion.

# 1.3 CASEWORK AND EQUIPMENT WORK

- A. Casework (Solid Wood) as specified in Section 11011.
  - 1. Manufacturer shall warrant the casework to be free from defects in materials and workmanship, under normal use and service, for **three (3) years** from date of delivery.
    - a. Within the warranty period, manufacturer shall repair, replace, or refund the purchase price of defective casework.

# 1.4 PLUMBING & DRAINAGE WORK

- A. General Requirements Plumbing as specified in Section 220010.
  - 1. Unconditionally guarantee in writing all materials, equipment and workmanship for a period of **one (1) year** from date of acceptance by Owner. During the guarantee period, repair or replace, at the Plumbing Trade Contractor's expense, any materials, equipment or workmanship in which defects may develop and provide free service for all equipment and systems involved in the contract during this guarantee period. Beneficial use of any system by the any of the Trade Contractors during construction does not constitute acceptance by the Owner. Time period of this beneficial use cannot be included in the guarantee period.
  - 2. Guarantee must also include restoration to its original condition of all adjacent work that is disturbed in fulfilling this guarantee.
  - 3. All such repairs and/or replacements must be made without delay and at the convenience of the Owner.

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- 4. Guarantees furnished by Trade Contractors and/or equipment manufacturers must be counter-signed by the related Trade Contractor for joint and/or individual responsibility for subject item.
- 5. Manufacturers' equipment guarantees or warranties extending beyond the guarantee period described in item #1 above must be transferred to the Owner along with the Trade Contractor's guarantees.
- B. Sanitary Waste and Vent Piping as specified in Section 221316.
  - 1. Listed manufacturers to provide labeling and warranty of their respective products.

# 1.5 HEATING, VENTILATING, AIR CONDITIONING AND REFRIGERATION WORK

- A. General Requirements HVAC as specified in Section 230010.
  - 1. Unconditionally guarantee in writing all materials, equipment and workmanship for a period of one (1) year from date of acceptance by Owner. During the guarantee period, repair or replace, at the HVAC Trade Contractor's expense, any materials, equipment or workmanship in which defects may develop and provide free service for all equipment and systems involved in the contract during this guarantee period. Beneficial use of any system by any of the Trade Contractors during construction does not constitute acceptance by the Owner. Time period of this beneficial use cannot be included in the guarantee period.
  - 2. Guarantee must also include restoration to its original condition of all adjacent work that is disturbed in fulfilling this guarantee.
  - 3. All such repairs and/or replacements must be made without delay and at the convenience of the Owner.
  - 4. Guarantees furnished by Trade Contractors and/or equipment manufacturers must be counter-signed by the related Trade Contractor for joint and/or individual responsibility for subject item.
  - 5. Manufacturers' equipment guarantees or warranties extending beyond the guarantee period described in item #1 above must be transferred to the Owner along with the Trade Contractor's guarantees.
- B. Testing, Adjusting, and Balancing as specified in Section 230593.
  - 1. General Warranty: The national project performance guarantee specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

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- 2. National Project Performance Guarantee: Provide a guarantee on AABC'S "National Standards" forms stating that AABC will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:
  - a. The certified Agent has tested and balanced systems according to the Contract Documents.
  - b. Systems are balanced to optimum performance capabilities within design and installation limits.
- 3. Special Guarantee: Provide a guarantee on NEBB forms stating that NEBB will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:
  - a. The certified Agent has tested and balanced systems according to the Contract Documents.
  - b. Systems are balanced to optimum performance capabilities within design and installation limits.
- 4. Special Guarantee: Provide a guarantee on TABB's "International Quality Assurance Program" forms stating that TABB will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:
  - a. The certified Agent has tested and balanced systems according to the Contract Documents.
  - b. Systems are balanced to optimum performance capabilities within design and installation limits.
- C. Direct Digital Control (DDC) System for HVAC as specified in Section 230923.
  - 1. Warrant labor and materials for specified control system free from defects for a period of **12 months** after project substantial completion. Control system failures during warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to Owner. Respond during normal business hours within 24 hours of Owner's warranty service request.
  - 2. Work shall have a single warranty date, even if Owner received beneficial use due to early system start-up. If specified work is split into multiple contracts or a multi-phase contract, each contract or phase shall have a separate warranty start date and period.
  - 3. Provide an extended service contract beyond first year warranty period if so desired by Owner.
- D. Interior Air-Handling Units as specified in Section 237343.
  - 1. Manufacturer shall provide a limited "parts only" warranty for a period of **12** months from the date of equipment start up or **18** months from the date of

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**original equipment shipment** from the factory, whichever is less. Warranty shall cover material and workmanship that prove defective, within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed. Warranty excludes parts associated with routine maintenance, such as belts and air filters.

- E. Exterior Air-Handling Units as specified in Section 237344.
  - 1. Manufacturer shall provide a limited "parts only" warranty for a period of **12 months from the date of equipment start up or 18 months from the date of original equipment shipment** from the factory, whichever is less. Warranty shall cover material and workmanship that prove defective, within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed. Warranty excludes parts associated with routine maintenance, such as belts and air filters.
- F. Unit Ventilators as specified in Section 238223.
  - 1. 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.
  - 2. Standard Unit Warranty: All components: **Two years** from date of Substantial Completion.

# **1.6 ELECTRICAL WORK**

- A. General Requirements Electrical as specified in Section 260010.
  - 1. Unconditionally guarantee in writing all materials, equipment and workmanship for a period of **one (1) year** from date of acceptance by Owner. During the guarantee period, repair or replace, at the Electrical Trade Contractor's expense, any materials, equipment or workmanship in which defects may develop and provide free service for all equipment and systems involved in the contract during this guarantee period. Beneficial use of any system by any of the Trade Contractors during construction does not constitute acceptance by the Owner. Time period of this beneficial use cannot be included in the guarantee period.
  - 2. Guarantee must also include restoration to its original condition of all adjacent work that is disturbed in fulfilling this guarantee.
  - 3. All such repairs and/or replacements must be made without delay and at the convenience of the Owner.

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- 4. Guarantees furnished by Trade Contractors and/or equipment manufacturers must be counter-signed by the related Trade Contractor for joint and/or individual responsibility for subject item.
- 5. Manufacturers' equipment guarantees or warranties extending beyond the guarantee period described in item #1 above must be transferred to the Owner along with the Trade Contractor's guarantees.
- B. Digital Programmed Lighting Control Devices as specified in Section 260923.
  - 1. Five (5) year 100% parts replacement.
- C. Analog Lighting Control Devices as specified in Section 260924.
  - 1. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.
    - a. Failures include, but are not limited to, the following:
      - 1) Faulty operation of lighting control devices.
    - b. Warranty Period: **Two year(s)** from date of Substantial Completion.
- D. LED Interior Lighting as specified in Section 265119.
  - 1. LED light fixtures provided as a part of this project shall be provided with a **5 year** warranty

## END OF SECTION 01900

**PART 2 - GENERAL CONSTRUCTION WORK** 

## **SECTION 02070 - SELECTIVE DEMOLITION**

## 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 DESCRIPTION OF WORK

- A. Extent of selective demolition Work is indicated on the Drawings.
- B. Type(s) of Selective Demolition Work: Demolition requires the selective removal and subsequent offsite disposal of the following:
  - 1. Portion(s) of building structure as indicated on Drawings, as required to accommodate new construction.
  - 2. Removal and protection of existing fixtures and equipment items indicated as "salvage", and reinstallation and/or deliver to the Owner.
- C. Removal Work Specified Elsewhere:
  - 1. Mechanical and Electrical Work Cutting non-structural concrete floors and masonry walls for underground piping, conduit, and for above grade piping, conduit, is included with the Work of the respective mechanical and electrical trades.
- D. Related Work Specified Elsewhere:
  - 1. Remodeling construction Work and patching is included within the respective sections of Specifications, including removal of materials for re-use and incorporated into remodeling or new construction.

## 1.3 SUBMITTALS

- A. Proposed Demolition Activities: Submit schedule indicating proposed methods and sequence of operations for selective demolition Work to Owner's Representative for review prior to commencement of Work. Provide starting and ending dates for each activity as appropriate.
  - 1. Include coordination for shut-off, capping, and continuation of utility services, as required, together with details for dust and noise control protection.
  - 2. Provide detailed sequence of demolition and removal Work to ensure uninterrupted progress of Owner's on-site operations.
  - 3. Sequence construction so as to minimize obstruction of exits and provide temporary alternate exits, as required by Authorities Having Jurisdiction.
  - 4. Coordinate with Owner's continuing occupation of portions of existing building, and with Owner's reduced usage during summer months.

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- B. Photographs: Photograph existing conditions of structure, surfaces, equipment or surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Owner's Representative prior to starting Work.
- C. Project Record Documents: Indicate unanticipated structural, electrical, or mechanical conditions.

## 1.4 JOB CONDITIONS

- A. Occupancy: Owner will be continuously occupying areas of the buildings immediately adjacent to areas of selective demolition. Conduct selective demolition Work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities which will severely impact Owner's normal operations.
- B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.
  - 1. Conditions existing at time of commencement of this Contract will be maintained by Owner insofar as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition Work.
- C. Protections: Provide temporary barricades and other forms of protection, as required, to protect Owner's personnel and general public from injury due to selective demolition Work.
  - 1. Provide protective measures, as required, to provide free and safe passage of Owner's personnel and general public to and from occupied portions of building.
  - 2. Protect existing finish Work, from being damaged during the project, which is to remain in place and becomes exposed during demolition operations.
  - 3. Protect floors with suitable coverings so as to leave the flooring in same condition at end of job.
  - 4. Construct temporary insulated solid dustproof partitions, where required, to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors, if required.
  - 5. Remove protections at completion of Work.
- D. Damages: Promptly repair damages caused to adjacent facilities by demolition Work at no cost to Owner, including but not limited to concealed interior and exterior utility lines not properly investigated by the Contractor, prior to commencement of demolition Work.
- E. Traffic: Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
  - 1. Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from Authorities Having Jurisdiction. Provide

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alternate routes around closed or obstructed traffic ways, if required by governing regulations.

- F. Explosives: Use of explosives <u>will not be permitted</u>.
- G. Utility Services: Maintain existing interior and exterior utilities indicated to remain, keep in service, and protect against damage during demolition operations.
  - 1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by Authorities Having Jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

## PART 2 - PRODUCTS (Not Applicable).

## PART 3 - EXECUTION

## 3.1 INSPECTION

- A. Prior to commencement of selective demolition Work, inspect areas in which Work will be performed.
  - 1. Photograph existing conditions of structure, surfaces, equipment or surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Owner's Representative prior to starting work.
  - 2. Commencement of work shall constitute acceptance of conditions. Any necessary remedial work required to correct any unsatisfactory conditions, found after the start of installation, will be provided at no cost to the Owner.
  - 3. Prior to the commencement of work review the demolition activities with the Owner's representative to identify additional salvage items requested by the Owner.

## 3.2 **PREPARATION**

- A. Cover and protect furniture, equipment and fixtures to remain from soiling or damage when demolition Work is performed in rooms or areas from which such items have not been removed.
- B. Erect and maintain dust-proof partitions and closures, as required, to prevent spread of dust or fumes to occupied portions of the building.
  - 1. Provide weatherproof closures for exterior openings resulting from demolition Work.
- C. Locate, identify, stub off and disconnect utility services that are not indicated to remain.
  - 1. Provide by-pass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shut-down of service is necessary during change-over.

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## 3.3 DEMOLITION

- A. Perform selective demolition Work in a systematic manner. Use such methods, as required, to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
  - 1. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
    - a. The Contractor shall use caution when cutting into existing masonry construction (eg.: concrete slabs, single wythe and cavity wall construction) as there may be undocumented utilities within the cavity or built into the cores of cmu wall construction or under the floor slab. The Contractor shall perform all necessary investigation prior to demolition Work to determine the presence of existing utilities within construction to be demolished, including but not limited to radar, thermal, impact echo, etc. The Contractor shall pay for restoring / repairing the existing construction if utilities are cut and proper selective demolition investigation Work was not performed. Refer to Section 01050.
  - 2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors or framing.
  - 3. Provide services for effective air and water pollution controls, as required by Authorities Having Jurisdiction.
  - 4. For interior slabs on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.
- B. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative / Architect in written, accurate detail. Pending receipt of directive from Owner's Representative / Architect rearrange selective demolition schedule as necessary to continue overall job progress without delay.

## 3.4 SALVAGE MATERIALS

- A. Salvage Items: Where indicated on Drawings as "Salvage-Deliver to Owner", carefully remove indicated items, clean, store and turn over to Owner and obtain receipt.
  - 1. Unless otherwise indicated all materials, items, equipment, etc. resulting from demolition Work shall be removed from the site at the Contractor's expense.
- B. Historic artifacts and articles of historic significance remain the property of the Owner. Notify Owner's Representative if such items are encountered and obtain acceptance regarding method of removal and salvage for Owner.

## 3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off-site.

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- B. If hazardous materials are encountered during demolition operations, notify the Owner's Representative immediately, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.
- C. Burning of removed materials is not permitted on project site.

## 3.6 CLEAN-UP AND REPAIR

- A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.
- B. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition Work. Repair adjacent construction or surfaces soiled or damaged by selective demolition Work.

## END OF SECTION 02070

## SECTION 02150 - SHORING AND BRACING

## 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. Extent of shoring and bracing work includes, but is not limited to, the following:
  - 1. Shoring and bracing necessary to protect existing building(s), streets, walkways, utilities, and other improvements and excavation against loss of ground or caving embankments.
  - 2. Maintenance of shoring and bracing.
  - 3. Removal of shoring and bracing, as required.
- B. Types of shoring and bracing system include, but are not limited to the following:
  - 1. Column shoring. (Building Structure)
  - 2. Scaffolding shoring. (Building Structure)
  - 3. Cantilever shoring. (Building Structure)

## 1.3 SUBMITTALS

A. Layout Drawings: Provide layout drawings for shoring and bracing system and other data prepared and sealed by a registered Professional Engineer licensed in the State of the project. System design and calculations must be acceptable to local authorities having jurisdiction.

## 1.4 QUALITY ASSURANCE

- A. Supervision: Engage and assign supervision of shoring and bracing work to a qualified consultant.
- B. Submit name of engaged consultant and qualifying technical experience.
- C. Regulations: Comply with local codes and ordinances of governing authorities having jurisdiction.

## 1.5 JOB CONDITIONS

A. Before starting work, check and verify governing dimensions and elevations. Survey condition of adjoining properties. Take photographs to record any prior settlement or cracking of structures and improvements. Prepare a list of such damages, verified by dated photographs, and signed by Contractor and others conducting investigation.

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- B. Survey adjacent structures and improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations. Locate datum level used to establish benchmark elevations sufficiently distant so as not to be affected by movement resulting from excavation operations.
- C. Maintain accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags or other damage is evident.

## **1.6 EXISTING UTILITIES**

- A. Protect existing active sewer, water, gas, electricity and other utility services and structures.
- B. Notify municipal agencies and service utility companies having jurisdiction. Comply with requirements of governing authorities and agencies for protection, relocation, removal and discontinuing of services, as affected by this work.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

A. General: Provide suitable shoring and bracing materials which will support loads imposed. Materials need not be new, but should be in serviceable condition.

## PART 3 - EXECUTION

## 3.1 SHORING

A. Wherever shoring is required, locate the system to clear permanent construction and to permit forming and finishing of concrete surfaces and all other materials.

## 3.2 BRACING

- A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing prior to removal of original brace.
- B. Do not place bracing where it will be cast into or included in permanent work, except as otherwise acceptable to Architect.
- C. Install internal bracing, if required, to prevent spreading or distortion to braced frames.
- D. Maintain bracing until structural elements are rebraced by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.
- E. Remove shoring and bracing in stages to avoid damage to structures, facilities, and utilities.
- F. Repair or replace, as acceptable to Architect, adjacent work damaged or displaced through installation or removal of shoring and bracing work.

## END OF SECTION 02150

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## SECTION 03300 - CONCRETE WORK

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

## 1.2 SUMMARY

A. Extent of concrete slab infill work is shown on the Drawings.

## 1.3 SUBMITTALS

- A. Product Data: Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds and others as required by Architect.
- B. Samples: Submit samples of materials as requested by Architect, including names, sources and descriptions.
- C. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test.
- D. Materials Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Architect. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.
- E. Shop Drawings: Reinforcement: Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing diagrams of bent bars, arrangement of concrete reinforcement.

## 1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:

ASTM C94/C94M	"Specification for Ready-Mixed Concrete"
ACI 117	"Tolerances for Concrete Construction and Materials"
ACI 211.1	"Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete"
ACI 301/301M	"Structural Concrete for Buildings."
ACI 302.1R	"Guide for Concrete Floor and Slab Construction"

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ACI 304R-00	"Guide for Measuring, Mixing, Transporting and Placing Concrete"
ACI 305R	"Hot Weather Concreting"
ACI 306R	"Cold Weather Concreting"
ACI 308.1	"Standard Specification for Curing Concrete"
ACI 311.1R	"ACI Manual of Concrete Inspection (SP-2)"
ACI 311.4R	"Guide for Concrete Inspection"
ACI 318	"Building Code Requirements for Reinforced Concrete", except as modified in accordance with International Building Code.
ACI 347R	"Guide to Formwork for Concrete"

Concrete Reinforcing Steel Institute, "Manual of Standard Practice."

- B. Concrete Testing Service: The Contractor shall engage a testing laboratory acceptable to Architect to perform material evaluation tests and to design concrete mixes.
- C. Materials and installed work may require testing and retesting at anytime during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.
- D. Installation of Vapor Barrier: Installation shall be in accordance with manufacturer's direction and in compliance with ASTM E 1745 "Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs".

## **PART 2 - PRODUCTS**

## 2.1 **REINFORCING MATERIALS**

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.
- D. Welded Deformed Steel Wire Fabric: ASTM A 497.
- E. Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications.

## 2.2 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II.
  - 1. Use one brand of cement throughout project, unless otherwise acceptable to Architect.

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- B. Normal Weight Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.
- C. Water: Drinkable.
- D. Water-Reducing Admixture: ASTM C 494, Type A, and containing not more than 0.05 percent chloride ions.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. "WRDA" Hycol"; W.R. Grace.
    - b. "Eucon WR-75" or "Eucon WR-89"; Euclid Chemical Co.
    - c. "Pozzolith 322N"; Master Builders.
    - d. "Plastocrete"; Sika Corp.
    - e. Or approved equal
- E. Water-Reducing, Non-Chloride Accelerator Admixture: ASTM C 494, Type E, and containing not more than 0.024 percent chloride ions.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. "Accelguard 80"; Euclid Chemical Co.
    - b. "Daraset"; W.R. Grace
    - c. Or approved equal
- F. Water-Reducing, Retarding Admixture: ASTM C 494, Type D and containing not more than 0.05 percent chloride ions.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. "Pozzolith Retarder"; Master Builders.
    - b. "Eucon Retarder 75"; Euclid Chemical Co.
    - c. "Daratard 17"; W.R. Grace.
    - d. "Plastocrete 161R"; Sika Corporation.
    - e. Or approved equal
- G. Prohibited Admixtures: Calcium chloride thyocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.

## 2.3 RELATED MATERIALS

- A. Non-Shrink Grout: CRD-C 621, factory pre-mixed grout.
  - 1. Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
    - a. Non-metallic:
      - 1) "Masterflow 713"; Master Builders
      - 2) "Euco-NS"; Euclid Chemical Co.
      - 3) "Five Star Grout"; U.S. Grout Corporation.
      - 4) Or approved equal
- B. Absorptive Cover: Burlap cloth made from jute or kenaf weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

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- C. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
  - 1. Waterproof paper.
  - 2. Polyethylene film.
  - 3. Polyethylene-coated burlap.
- D. Clear curing and sealing compound (VOC Compliant): The compound shall have 30% solids content minimum, and will not yellow under ultra violet light after 500 hours of test in accordance with ASTM D 4887 and will have test data from an independent testing laboratory indicating a maximum moisture loss of 0.039 grams per sq. cm. when applied at a rate of 300 sq. ft. per gallon. Sodium silicate compounds are <u>not</u> permitted.
  - 1. Product: "Super Diamond Clear Vox" by Euclid Chemical Co.; or approved equal.
- E. Vapor Barrier: Provide vapor barrier cover over prepared base material where indicated. Use only materials which are resistant to decay when tested in accordance with the following:
  - 1. Thickness: 15 mils.
  - 2. Permeance: ASTM E 96; .01 perms before and after conditioning and in accordance with ASTM E 1745 Class A requirements and ATM E 154 for mandatory conditioning tests.
  - 3. Puncture Resistance: ASTM D 1709; 2200 grams.
  - 4. Chemical Resistance: ASTM E 154, unaffected.
  - 5. Life Expectancy: ASTM E 154, indefinite.
  - 6. Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
    - a. "Wrap 15-mil" Vapor Barrier; Stego Industries, LLC.
    - b. "VaporFLEX" by Layfield.
    - c. "Moistop Ultra 15-mil" by Fortifiber.
    - d. "Griffolyn G15" by Reef.
    - e. Or approved equal.
  - 7. Accessories: Seam tape; ASTM E 96, 0.3 perms or lower.
  - 8. Vapor barrier sheets with seams overlapped not less than 12".
  - 9. All penetrations must be sealed using a combination of the manufacturer's tape and/or mastic.
  - 10. Installation shall be in accordance with manufacturer's direction and in compliance with ASTM E 1643-98 "Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs". Include manufacturer's recommended adhesive or pressure-sensitive tape.
- F. Joint-Filler Strips: ASTM D 1752, cork or self-expanding cork.

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## 2.4 **PROPORTIONING AND DESIGN OF MIXES**

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.
- B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Architect.
- C. Design mixes to provide normal weight concrete with the following properties, as indicated on Drawings:
  - 1. 3000 psi 28-day compressive strength; W/C ratio, 0.68 non-air entrained,
- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be admitted to and accepted by Architect before using in work.
- E. Admixtures:
  - 1. Use water-reducing admixture or high range water-reducing admixture (super plasticizer) in concrete as required for placement and workability.
  - 2. Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.
- F. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
  - 1. Ramps, slabs and sloping surfaces: Not more than 3".
  - 2. Other concrete: Not less than 1" nor more than 4"

## 2.5 CONCRETE MIXING

- A. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified.
- B. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.

## **PART 3 - EXECUTION**

## 3.1 PLACING REINFORCEMENT

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

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- 1. Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations.
- B. Clean reinforcement of loose rust and mill scale, earth, ice and other materials which reduce or destroy bond with concrete.
- C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.
- D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

## 3.2 JOINTS

- A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate at a maximum spacing of 90 feet, so as not to impair strength and appearance of the structure, as acceptable to Architect.
- B. Control Joints: Locate and install control joints as indicated or at a maximum spacing of 30 feet. Locate at a spacing which does not impair appearance of the structure as acceptable to Architect.
- C. Joint filler and sealant materials are specified in Section 07900.

## 3.3 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto.
- B. Installation of Vapor Barrier: Install materials in accordance with manufacturer's direction and in compliance with ASTM 1643-98 "Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs".
  - 1. Seal all slab penetrations with manufacturer's approved or recommended tapes, sealants, adhesives, and other materials to achieve indicated testing requirements.
  - 2. Protect vapor barrier materials during construction operation, repair or replace damaged material with new materials.

## 3.4 CONCRETE PLACEMENT

A. Pre-placement inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel and items to be embedded or cast-in. Notify other crafts to

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permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

- 1. Apply temporary protective covering to lower 2' of finished walls adjacent to poured floor slabs and similar conditions, and guard against spattering during placement.
- B. General: Comply with ACI 304R-00 "Guide for Measuring, Mixing, Transporting and Placing Concrete", and as herein specified.
- C. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
- D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
- E. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
- F. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
- G. Maintain reinforcing in proper position during concrete placement operations.
- H. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which would be caused by frost, freezing actions or low temperatures, in compliance with ACI 306R.
- I. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.
- J. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305R.

## 3.5 MONOLITHIC SLAB FINISHES

- A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered as otherwise indicated.
- B. After screeding, consolidating and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances as follows:
  - 1. Ff 12 Fl 9 For noncritical areas: mechanical rooms and surfaces to have thick-set tile.
  - 2. Ff 15 Fl 12 For carpeted areas
  - 3. Ff 21 Fl 15 For thin-set flooring

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- 4. Ff 27 Fl 21 For warehouse, gymnasiums.
- 5. Ff 30 Fl 30 For TV studios

Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

- C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
- D. After floating, begin first trowel finish operation using a power driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances as follows:
  - 1. Ff 20 Fl 15 For noncritical areas: mechanical rooms and surfaces to have thick-set tile.
  - 2. Ff 25 Fl 20 For carpeted areas
  - 3. Ff 35 Fl 25 For thin-set flooring
  - 4. Ff 45 Fl 35 For warehouse, gymnasiums.
  - 5. Ff 50 Fl 50 For TV studios

Grind smooth surface defects which would telegraph through supplied floor covering system.

## 3.6 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 308 (latest edition) procedures. Avoid rapid drying at end of final curing period.
- D. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing and by combinations thereof, as herein specified.
- E. Provide moisture curing by following methods.
  - 1. Keep concrete surface continuously wet by covering with water.
  - 2. Continuous water-fog spray.
  - 3. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 12" lap over adjacent absorptive covers.
- F. Provide moisture-cover curing as follows:
  - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, place in

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widest practicable width with sides and ends lapped at least 12" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

# G. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, flooring (such as ceramic or VCT), painting and other coatings and finish materials, unless otherwise acceptable to Architect.

- H. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.
- I. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture retaining cover, unless otherwise directed.

## 3.7 CONCRETE SURFACE REPAIRS

- A. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.
- B. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets and other objectionable conditions.
- C. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.
- D. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.
- E. Underlayment Application: Leveling of floors for subsequent finishes may be achieved by use of specified underlayment material.

## 3.8 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. The Contractor will employ and pay for a testing laboratory to perform the following tests, inspect formwork and reinforcement placement and to submit test reports. Testing laboratory must be pre-approved by the Architect.
- B. Sampling and testing for quality control during placement of concrete may include the following, as directed by Architect.
- C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
  - 1. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.

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- 2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
- D. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
- E. Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
- F. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
- G. Test results will be reported in writing to Architect, Structural Engineer and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.
- H. Nondestructive Testing: Impact hammer, sonoscope or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- I. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.

## END OF SECTION 03300
## SECTION 03450 - SELF-DRYING FINISHING UNDERLAYMENT

### 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. Extent of Self Drying Cement Based Finishing Underlayment for flooring work as indicated on Drawings.
- B. Related Sections:
  - 1. Section 09300 Tile
  - 2. Section 09650 Resilient Flooring

## 1.3 **DEFINITIONS**

A. Self-Drying Finishing Underlayment for flooring includes systems which consist of materials specially formulated, portland cement self-smoothing, rapid hardening compound to level and repair existing interior concrete slabs.

### 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, installation instructions, and general recommendations for each major product required. Include data substantiating that products to be furnished comply with requirements of the Bid Documents.
- B. Test Reports: Submit results of testing specified.
  - 1. Certificates: Submit manufacturer's test data certifying compliance with specified performance requirements.
  - 2. Test reports: Submit test data for moisture content and hydrostatic pressure of existing concrete slab.
- C. Certificates: Submit manufacturer's certification that products comply with requirements of the Bid Documents.

### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain required products from a single manufacturer.
- B. Manufacturer Experience: Provide products of this section by companies which have successfully specialized in production of this type of work for a recommended 5 years.

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- C. Installer's Qualifications: All work of this section shall be performed by an experienced applicators, licensed by the manufacturer of the system and successfully completed this type of work for a recommended 2 years.
- D. Codes and Standards: Comply with requirements of the contract documents or of governing codes and authorities having jurisdiction.
- E. Mock-up: Prior to installation of work of this section, erect sample at location directed by or acceptable to the Architect, using specified materials and workmanship to be expected in the completed work. Once mock-up has been approved by the Architect, retain until the work has been completed and accepted.
  - 1. Configuration: Approximately 4 feet by 4 feet.
  - 2. Mock-up <u>may not</u> be incorporated into the final work; demolish and remove from site when directed by the Architect.
- F. Pre-installation Conference: Prior to installation of work of this section, conduct a meeting at the project site to discuss quality assurance requirements. In addition to the contractor and the installer, arrange for attendance of the following:
  - 1. Other installers affected by the work of this section.
  - 2. The Owner's representative.
  - 3. The Architect.
  - 4. Manufacturer's representative.
  - 5. Supplier.
- G. Allowable Tolerances:
  - 1. Variation from Level: Do not exceed 1/4 inch in any bay or 10 feet in distance.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Keep materials dry at all times. Protect against exposure to weather and against contact with damp or wet surfaces.
- B. Store materials on one site to maintain proper separation and grading integrity. Cover materials to prevent excessive accumulation of moisture.
- C. Protect materials from excessive moisture in shipment, storage, and handling. Deliver materials in manufacturer's unopened packages, and store in dry place with adequate air circulation.
- D. Storage: Stack products of this section carefully to provide air circulation within stacks.

## 1.7 **PROJECT CONDITIONS**

A. Environmental Requirements: Do not proceed with installation when air temperatures are below 40°F, or above 95°F, unless protective measures acceptable to the manufacturer are taken.

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- B. Do not proceed with installation until temperature and relative humidity have been stabilized and will be maintained within values established by the manufacturer for optimum quality control.
- C. Provide adequate ventilation to prevent accumulation of hazardous fumes during application of components in enclosed spaces, and maintain ventilation until materials have thoroughly cured.

## 1.8 SEQUENCING AND SCHEDULING

A. Coordinate work of this section with other trades and installation of special construction and equipment.

## 1.9 WARRANTY

- A. Special Project Warranty: Submit a written warranty signed by the manufacturer, the Contractor, and the installer, guaranteeing to correct failures in materials and workmanship which occur within the warranty period, including those attributable to abnormal aging, without reducing or otherwise limiting any other rights to correction which the Owner may have under the Bid Documents.
  - 1. The warranty shall include responsibility for removing and replacing other work as necessary to accomplish repairs or replacement of materials covered by the warranty. a. Warranty period: Minimum **two (2) years** after date of substantial completion.

### PART 2 - PRODUCTS

### 2.1 MIXES

- A. Basis of Design: "Ardex Feather Finish" Self-Drying, Cement -Based Finishing Underlayment, as manufactured by ARDEX Engineered Cements; or approved equal.
- B. Subject to compliance with requirements of the Contract Documents, manufacturers offering products which may be incorporated in work include the following:
  - 1. Mapei,
  - 2. CMP Specialty Products,
  - 3. Or approved equal.
- C. Follow the manufacturer's printed instructions, procedures and recommended equipment for mixing the components.
  - 1. Mixing Ratio:  $2\frac{1}{2}$  quarts of water per 10 lbs. bag at 70°F.
    - a. For smaller batches, use 2 parts powder to 1 part water by volume.
- D. Compressive Strength: ASTM C 109, 4200 psi, minimum.
- E. VOC: 0

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### PART 3 - EXECUTION

## 3.1 **EXAMINATION**

- A. Inspect substrates and conditions under which the work of this section will be performed, and verify that installation properly may commence. Do not proceed with the work until unsatisfactory conditions have been resolved fully.
  - 1. <u>Commencement of work shall constitute acceptance of conditions</u>. Any necessary remedial work required to correct any unsatisfactory conditions, found after the start of installation, will be provided at no cost to the Owner.
  - 2. If asbestos abatement of flooring products was performed (by others), review product information on the product(s) used (by others) to remove the adhesive(s) to ensure compatibility.
- B. Testing: Perform required testing of existing concrete slab, for hydrostatic pressure and moisture content. Follow manufacturer's recommended procedures for testing slab. Do not proceed with the work until unsatisfactory conditions have been resolved fully.

## 3.2 **PREPARATION**

- A. Clean substrate, removing projections, all loose material and substances detrimental to the work; comply with recommendations of manufacturer of products to be installed for proper preparation procedures.
- B. Prepare substrate in accordance with recommendations of manufacturer for optimum installed performance.
- C. Mask off or otherwise protect adjacent surfaces not scheduled to receive products of this section.
- D. Coordinate installation with other trades, report conditions in writing to the Owner/Architect. Do not proceed with application work until any unsatisfactory conditions have been corrected.

## 3.3 APPLICATION

- A. General: Comply with manufacturer's instructions, except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
  - 1. Apply materials to the substrate with flat side of a steel trowel to obtain a solid mechanical bond. Apply sufficient pressure to fill all defects and to feather the product into the subfloor surface and to suit existing substrate conditions.

### 3.4 CLEANING

A. Upon completion, clean all surfaces which have become soiled or coated as a result of work of this section, using proper methods which will not scratch or otherwise damage finished surfaces.

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B. For cleaning, use only products and techniques acceptable to manufacturer of products being cleaned.

## 3.5 **PROTECTION**

A. General: Institute protective procedures and install protective materials as required to ensure that work of this section will be without damage or deterioration.

# **END OF SECTION 03450**

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## SECTION 04200 - UNIT MASONRY

### PART 1 - GENERAL

#### 1.1 **RELATED DOCUMENTS**

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

## **1.2 DESCRIPTION OF WORK**

- A. Extent of each type of masonry work is indicated on drawings and schedule.
- B. Type of masonry work required includes:
  - 1. Concrete unit masonry.
  - 2. Brick masonry.
  - 3. Concrete masonry lintels and bond beams.
  - 4. Mortar and grout.
  - 5. Reinforcement, anchorage, and accessories.
  - 6. Concealed Flashing.
  - 7. Installation of miscellaneous loose steel lintels, plates and other steel fabrications.
- C. Related Work:
  - 1. Section 07200 Building Insulation.
  - 2. Section 07270 Fluid Applied Air/Vapor Barriers.
  - 3. Section 07600 Flashing, Sheet Metal and Roof Accessories.
  - 4. Section 07900 Joint Sealer Assemblies.
  - 5. Section 08110 Hollow Metalwork.
  - 6. Section 08415 Aluminum Storefront.
  - 7. Section 09250 Gypsum Drywall.
  - 8. Section 09900 Painting of exposed to view CMU surfaces.

### 1.3 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Where indicated, provide materials and construction which are identical to those of assemblies whose fire endurance has been determined by testing in compliance with ASTM E119 by a recognized testing and inspecting organization or by another means, as acceptable to authority having jurisdiction.
- B. Single Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.
- C. Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

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- D. Field Constructed Mock-Ups: Prior to installation of masonry work, erect sample wall panels to further verify selections made for color and textural characteristics, under sample submittals of masonry units and mortar, and to represent completed masonry work for qualities of appearance, materials and construction.
- E. Build mock-up(s) in size of approximately 18" long by 18" high, brick panel to confirm selection of brick (size, color and texture) and mortar match.
- F. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and filed, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
- H. Masonry Pre-Installation Meeting: Prior to installation of any above-grade masonry work, there shall be a Masonry Pre-Installation Meeting between the General Construction Work Contractor, all masonry Subcontractors (if any), and the Architect. At this meeting, all masonry construction products and procedures shall be reviewed.

## 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each type of masonry unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements.
- B. Samples for Verification Purposes: Submit the following samples:
  - 1. For selection of brick, submit products of all local manufacturers that the manufacturers consider to be their closest match. Resubmit until match meets approval of Architect.
  - 2. Colored masonry mortar samples for each color required showing the full range of color which can be expected in the finished work. Label samples to indicate type and amount of colorant used.
- C. Shop Drawings: Submit shop drawings for the following:
  - 1. All locations of Vertical Control Joints for interior concrete masonry unit walls including control joints shown.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry materials to project in undamaged condition.
- B. Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes.
- C. Limit moisture absorption of concrete masonry units during delivery and until time of installation to the maximum percentage specified for Type I units for the average annual relative humidity as reported by the U.S. Weather Bureau Station nearest project site.
- D. Store cementitious materials off the ground, under cover and in dry location.
- E. Store aggregates where grading and other required characteristics can be maintained.

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- F. Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.
- G. Coordinate delivery and application of air/vapor barrier with the delivery and application of the cavity insulation to ensure the installation of these products are completed within the same construction phase.
- H. Deliver air/vapor barrier membranes, adhesives and primers to the jobsite in undamaged and original packaging indicating the name of the manufacturer and product. Store roll materials on end in original packaging. Protect rolls from direct sunlight until ready for use. Store air/vapor barrier membranes, adhesives and primers at temperature of 40°F. and rising. Keep solvent away from open flame and excessive heat.

## 1.6 **REFERENCE STANDARDS**

- A. Comply with the current applicable provisions of all codes, regulations, industry standards and specifications referenced in this section, unless otherwise modified by the requirements of the Contract Documents, including but not limited to the following:
  - 1. ACI 531 Building Code Requirements for Masonry Structures.
  - 2. ACI 531 Commentary on Building Code Requirements for Masonry Structures.
  - 3. ACI 530.1 Specification for Masonry Construction.
  - 4. ASTM C-90 Load Bearing Masonry Units.
  - 5. ASTM C-129 Non-Load Bearing Masonry Units.
  - 6. ASTM C 140 Testing Concrete Masonry Units.
  - 7. ASTM C 216 Testing Facing Brick (Solid Masonry Units Made from Clay or Shale).
  - 8. ASTM C 270 Standard Specification for Mortar for Unit Masonry
  - 9. ASTM C 780 Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
  - 10. ASTM C 1586 Standard Guide for Quality Assurance of Mortars.
  - 11. ASTM E 119 Fire Tests with Building Construction and Materials.
  - 12. BIA Technical Notes on Brick Construction.
  - 13. BIA Technical Notes on Brick Construction: Technical Note #46 "Maintenance of Brick Masonry.
  - 14. NCMA TEK Bulletins.
  - 15. ASTM D7957/D7957M Standard Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement.
  - 16. ASTM E2178 Standard Test Method for Air Permeance of Building Materials
  - 17. ASTM E2357 Standard Test Method for Determining the Air Leakage of Air Barrier Assemblies.
  - 18. ASTM E96 Water Vapor Transmission of Materials.
  - 19. NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

## 1.7 **PROJECT CONDITIONS**

- A. Protection of Work: During erection, cover wall(s) with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

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- B. Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls.
- C. Do not apply concentrated loads for at least 3 days after building masonry walls.
- D. Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Remove immediately grout or mortar in contact with such masonry.
- E. Protect sills, ledges and projections from droppings of mortar.
- F. Cold Weather Protection:
  - 1. Do not lay masonry units which are wet or frozen.
  - 2. Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.
  - 3. Remove masonry damaged by freezing conditions.
  - 4. For clay masonry units with initial rates of absorption (suction) which require them to be wetted before laying, comply with the following requirements:
    - a. For units with surface temperatures above  $32^{\circ}F(0^{\circ}C)$ , wet with water heated to above  $70^{\circ}F$ .
    - b. For units with surface temperature below 32 °F (0 °C), wet with water heated to above 130 °F.
- G. Perform the following construction procedures while masonry work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation except for grout.
- H. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10°F.
  - 1. 40 degrees F to 32 degrees F:
    - a. Mortar: Heat mixing water to produce mortar temperature between 40°F and 120°F. Setting time will be limited to 60 minutes from initial mixing.
    - b. Grout: Follow normal masonry procedures.
  - 2. 32 degrees F to 25 degrees F:
    - a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F and 120°F; maintain temperature of mortar on boards above freezing.
    - b. Grout: Heat grout materials to  $90^{\circ}$ F to produce in-place grout temperature of  $70^{\circ}$ F at end of work day.
  - 3. 25 degrees F to 20 degrees F:
    - a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F and 120°F; maintain temperature of mortar on boards above freezing.
    - b. Grout: Heat grout materials to  $90^{\circ}$ F to produce in-place grout temperature of  $70^{\circ}$ F at end of work day.
    - c. Heat both sides of walls under construction using salamanders or other heat sources.
    - d. Use windbreaks or enclosures when wind is in excess of 15 mph.

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- 4. 20 degrees F and below:
  - a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40°F and 120°F.
  - b. Grout: Heat grout materials to  $90^{\circ}$ F to produce in-place grout temperature of  $70^{\circ}$ F at end of work day.
  - c. Masonry Units: Heat masonry units so that they are above 20°F at time of laying.
  - d. Provide enclosure and auxiliary heat to maintain an air temperature of at least 40°F for 24 hours after laying units.
  - e. Do not heat water for mortar and grout to above 160°F.
- I. Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry, temperature ranges apply to anticipated minimum night temperatures.
  - 1. 40 degrees F to 32 degrees F:
    - a. Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.
  - 2. 32 degrees F to 25 degrees F:
    - a. Completely cover masonry with weather-resistive membrane for at least 24 hours.
  - 3. 25 degrees F to 20 degrees F:
    - a. Completely cover masonry with weather-resistive insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.
  - 4. 20 degrees F and below:
    - a. Except as otherwise indicated, maintain masonry temperature above 32°F (0°C) for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps or other methods proven to be satisfactory. For grouted masonry maintain heated enclosure to 40°F (4°C) for 48 hours.

## 1.8 WARRANTY

- A. The Contractor shall warrant the exterior walls to be free from leakage due to any natural cause for a period of **five (5) years** from date of final acceptance of the building and he shall, within such period at his own expense, upon written notification from the Owner, pursue such remedial measures as may be necessary to correct any condition of leakage and damage incidental thereto that may develop. The Contractor in signing this Contract accepts the above conditions. In so doing, he also agrees either that the materials and methods specified herein are such as to insure the results required or that he will, at no additional expense, furnish such additional or alternative items of labor and materials (or both) as may be necessary to accomplish the stated intent of the Contract.
- B. Stainless Steel Fabric Flashing:
  - 1. Manufacturer shall warrant flexible flashing material for **life of the wall**.

#### PART 2 - PRODUCTS

## 2.1 GENERAL

- A. Manufacturer: Obtain masonry units from one manufacturer, of uniform texture and color for each kind required, for each continuous area and visually related areas.
  - 1. Brick: Subject to compliance with requirements, manufacturers of brick units which may be incorporated in the work include, but are not limited to, the following:
    - a. Church Brick Company.
    - b. Consolidated Brick.
    - c. Diener Brick Company.
    - d. Tri-State Brick & Building Materials, Inc.
    - e. The Belden Brick Company.
    - f. Or approved equal.
  - 2. Concrete and Architectural Masonry Units: Subject to compliance with requirements, manufacturers of concrete masonry units which may be incorporated in the work include, but are not limited to, the following:
    - a. Anchor Concrete Products Inc.
    - b. Clayton Block Co., Inc.
    - c. EP Henry Corporation.
    - d. York Building Products, a Stewart Company.
    - e. Or approved equal.
  - 3. Masonry Anchors, Joint Reinforcing, Accessories, etc.: Subject to compliance with requirements, manufacturers of masonry anchors, joint reinforcing, accessories which may be incorporated in the work include, but are not limited to, the following:
    - a. Heckman Building Products, Inc.
    - b. Hohmann & Barnard, Inc.
    - c. Or approved equal.

## 2.2 BRICK MADE FROM CLAY OR SHALE

- A. General: Comply with referenced standards and other requirements indicated below applicable to each form of brick required.
- B. Size: Provide bricks manufactured to the following actual dimensions:
  - 1. Match existing.
- C. Provide special molded shapes where indicated and for application requiring brick of form, size and finish on exposed surfaces which cannot be produced from standard brick sizes by sawing.
- D. For sills, caps and similar applications resulting in exposure of brick surfaces which otherwise would be concealed from view, provide uncored or unfrogged units with all exposed surfaces finished.

- E. Facing Brick: ASTM C 216, and as follows.
  - 1. Grade SW.
  - 2. Type: FBS.
  - 3. Compressive Strength: 8,000 psi, average, per ASTM C67.
  - 4. Application: Use where brick is exposed, unless otherwise indicated.
  - 5. Texture and Color: Match existing.
  - 6. Wherever shown to "match existing", provide face brick of matching color, texture and size as existing adjacent brickwork.
- F. Efflorescence: Provide brick tested and rated in compliance with ASTM C67.

# 2.3 CONCRETE MASONRY UNITS

- A. General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.
- B. Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.
  - 1. Provide bullnose units for outside corners unless otherwise indicated.
- C. Concrete Block: Provide units complying with characteristics indicated below for face size, exposed face and under each form of block included, for weight classification.
- D. Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8" high (15-5/8" x 7-5/8" actual) x thicknesses indicated.
- E. Where special patterns are indicated, provide units with exposed faces matching color, texture and pattern of Architect's sample.
- F. Hollow Loadbearing Block: ASTM C90 and as follows:
  - 1. Weight Classification: Lightweight.
- G. Solid Loadbearing Block: ASTM C90 and as follows: (Below grade and wherever else solid CMU is indicated.
  - 1. Weight Classification: Lightweight.

## 2.4 MASONRY LINTELS

- A. General: Provide one of the following:
  - 1. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMU's matching adjacent CMU's in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

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### 2.5 MORTAR AND GROUT MATERIALS

- A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds or other admixtures, unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar or grout.
- B. Limit cementitious materials in mortar to portland cement-lime.
- C. Portland Cement: ASTM C150, Type 1, except Type III may be used for cold weather construction. Provide natural color or white cement as required to produce required mortar color.
- D. For colored aggregate mortars use masonry cement, ASTM C91, of natural color or white as required to produce mortar colors required.
- E. Hydrated Lime: ASTM C207, Type S.
- F. Aggregate for Mortar: ASTM C144, except for joints less than 1/4 inch use aggregate graded with 100% passing the No. 16 sieve.
  - 1. White Mortar Aggregates: Natural white sand or ground white stone.
  - 2. Colored Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.
- G. Mortar: ASTM C387, Type N. Provide mortar for face brick and accessories to match original mortar in color, texture, strength and hardness (density and porosity). Determine existing mortar mix constituents and ratios by analysis. Review laboratory evaluations with Architect before proceeding with the work. Match color of existing mortar by use of aggregates matching original aggregate color where possible. Use inorganic coloring pigments if satisfactory color match cannot be attained with natural materials.
  - 1. Use Type M mortar for masonry below grade and in contact with earth, and where indicated.
  - 2. Use Type S mortar for exterior, above-grade loadbearing and non-loadbearing CMU walls; for interior loadbearing CMU walls; and for other applications where another type is not indicated.
- H. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification, for types of mortar required, unless otherwise indicated.
- I. Grout for Unit Masonry: Comply with ASTM C476.
  - 1. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143.
- J. The proper use of ASTM C270 and Test Method ASTM C780 for evaluating masonry mortars produced in the laboratory and the construction site is in accordance with ASTM C1586.

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- K. Aggregate for Grout: ASTM C404.
- L. Water: Clean and potable.
- M. Colored Aggregate Mortar: Produce mortar of color required by use of colored aggregates in combination with selected cementitious materials.
  - 1. Colors as selected by the Architect from manufacturer's available full range of colors.

## 2.6 JOINT REINFORCEMENT, TIES AND ANCHORING DEVICES

- A. Materials: Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie and anchor for size and other characteristics:
  - 1. Hot-Dip Galvanized Steel Wire: ASTM A82 for uncoated wire and with ASTM A153, Class B-2 (1.5 oz. per sq. ft. of wire surface) for zinc coating applied after prefabrication into units.
- B. Joint Reinforcement: Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units, and complying with requirements indicated below:
  - 1. Width: Fabricate joint reinforcement in units with widths of approximately 2 inch less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8 inch on joint faces exposed to exterior and ½ inch elsewhere.
    - a. Wire Size for Side Rods: 9 gauge.
    - b. Wire Size for Cross Rods: 9 gauge.
  - 2. Ladder design rods spaced not more than 16 inch o.c.
  - 3. Number of Side Rods: One side rod for each face shell of concrete masonry back-up and one rod for brick wythe.
  - 4. Configuration:
    - a. Applications of Single Wythe Wall width: Ladder type design rods at not more than 16 inches on center.
      - 1) Basis of Design: Provide Hohmann & Barnard, Inc., No.# 220, Ladder-Mesh; or approved equal.
    - b. Applications of more than one unit width (Composite Wall): Ladder type design rods at not more than 16 inches on center:
      - 1) Basis of Design: Provide Hohmann & Barnard, Inc., No.# 240, Ladder-Twin-Mesh; or approved equal.
    - c. Applications of more than one unit width, exterior cavity walls (Masonry back-up), Seismic design:
      - 1) Basis of Design: Provide Hohmann & Barnard, Inc., No.# 270-ML (Mighty-LOK® Ladder style); or approved equal.
- C. Flexible Anchors: Where flexible anchors are indicated for connecting masonry to structural framework, provide 2-piece anchors as described below which permit vertical or horizontal differential movement between wall and framework parallel to, but resist tension and compression forces perpendicular to, plane of wall.

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- 1. For anchorage to steel framework provide manufacturer's standard anchors with triangular-shaped wire tie section sized to extend within 1 inch of masonry face. Coordinate with Steel Contractor for type and size required. Provide 3/16 inch diameter, hot-dip galvanized steel.
- 2. Provide Hohmann & Barnard, Inc., Slip-Set Stabilizer to anchor new brick end caps to existing masonry wall(s); or approved equal.
- D. Unit Type Masonry Inserts in Concrete: Furnish cast iron or malleable iron inserts of type and size indicated.
- E. Reinforcing Bars: Deformed steel, ASTM A615, Grade 60 for bars No. 3 to No. 18.

## 2.7 CONCEALED FLASHING MATERIALS

- A. <u>Type 2</u>: Thru-Wall Stainless Steel Flashing: (At the head of window, door and unit ventilator masonry openings, existing columns in masonry cavity wall or where indicated). Provide end dams where shown, or as required.
  - 1. Basis of Design: "Multi-Flash SS", as manufactured by York Manufacturing, Inc.; or approved equal.
    - a. Subject to compliance with requirements of the Bid Documents, manufacturers offering products which may be incorporated in work include the following:
      - 1) Illinois Products, Inc.; IPCO Stainless Steel Fabric Flashing
      - 2) Prosoco, Inc.; R-Guard SS ThruWall
      - 3) STS Coatings, Inc.; Wall Guardian Stainless Steel TWF
      - 4) TK Products, Inc.; TK TWF
      - 5) Or approved equal.
  - 2. Characteristics:
    - a. Type: Stainless steel core with polymer fabric laminated to the bottom stainless steel face with non-asphalt adhesive. The top face (exposed side) must not be covered with a polymer fabric.
    - b. Stainless steel: type 304, ASTM A240. Domestically sourced per DFARS 252.225-7008 and/or DFARS 252.225-7009.
    - c. Fabric: polymer fabric; laminated back face (non-exposed side) of stainless-steel core.
    - d. Size: Manufacturer's standard width rolls.
  - 3. Size: Manufacturer's standard roll width and length.
  - 4. Accessories:
    - a. Mastic/sealant: Product standard of quality is York Manufacturing, Inc.; UniverSeal US100; or approved equal.
      - 1) Characteristics:
        - a) Type: One part 100% solids, solvent-free formulated silyl-terminated polyether (STPE), ASTM C920-11, Type S, Grade NS, Class 50.
    - b. Outside corner and inside corner material; manufacturer's standard available units using:
      - 1) Multi-Flash SS; or approved equal.
      - 2) Preformed stainless steel: 26-gauge stainless steel.

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- c. End dam: Product may be folded in line with the flashing material or utilize preformed end dams by manufacturer using:
  - 1) Preformed stainless steel: 26-gauge stainless steel.
- d. Splice material: Product standard of quality is York304 SA by York; or approved equal. Manufacturer's standard self-adhered metal material: material matching system material or use Multi-Flash SS 6"; or approved equal, lap piece and polyether sealant as a splice.
- e. Termination Bar: Product standard of quality is York T-96 termination bar; or approved equal. Manufacturer's standard 1" composite material bar or a 1" 26-gauge stainless steel termination bar with sealant lip.
- f. Weep Vent Protection:
  - 1) Product standard of quality is York's Weep-Armor; or approved equal. Geotextile drainage fabric at least 12" in height.
  - 2) Weep-Net A; or approved equal, free draining mesh material that will not degrade in the cavity wall and is made of polymer strands. Dovetailed design, 10" high and the dovetailed slots are 7" deep.
- g. Drip Edge: Stainless-steel with 30-degree 3/8" bent outer edge, hemmed. 3" by 8'.
- h. Weep Vents: Product standard of quality is York's Stainless-steel weep vents; or approved equal. Stainless-steel mesh vent in 2.5 x 3.5 (Standard) or/ 3.5 x 3.5 (Jumbo), match existing condition.
- i. Repair and other materials/accessories: Manufacturer's standard.
- j. Fasteners: Domestic manufactured fastener types and sizes recommended by flashing manufacturer for intended use.

#### 2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Non-Metallic Expansion Joint Strips: Premolded, flexible cellular neoprene rubber filler strips complying with ASTM D1056, Grade 2A1, capable of compression up to 35%, of width and thickness indicated.
- B. Compressible Insulation at Top of Walls: A high-density mineral fiber insulation rated noncombustible as tested per ASTM E136.
  - 1. Basis of Design: Provide "TopStop Head-of Wall"; Thermafiber with 3M "Firedam" fire rated sealant; or approved equal. Refer to Section 07840 for Fire-Resistive Joint Systems.
  - 2. Insulation shall sustain temperature above 2,000°F in accordance with ASTM E119 and comply with ASTM E84 for the following:
    - a. Flame Spread: 0
    - b. Smoke Developed: 0
  - 3. Provide size and shape to suit indicated conditions.
- C. Fire Rated Control and Expansion Joints, Joint Filler and Sealant:
  - 1. Provide fire-rated sealant in accordance with UL Listed design for fire-rated joint assemblies.
  - 2. For expansion and control joint filler and sealant, as specified in Section 07900.

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- D. Weepholes: Provide the following for weepholes:
  - 1. Plastic, Rectangular with screen: Item # 342 W/S; Hohmann & Barnard, Inc.; or approved equal.
    - a. Medium density polyethylene 3/8 inch x 1-1/2 inch x 3-1/2 inch clear color plastic with stainless steel screens and cotton wicks.
- E. Mortar Net: Basis of Design: Provide Mortar Net as manufactured by Mortar Net USA, Ltd.; or approved equal.
  - 1. Size: 10 inches high x  $1\frac{1}{2}$  inches thick x 5 feet long.
  - 2. Provide mortar net inside masonry cavity walls to keep weepholes open. Install in accordance with manufacturer's printed instructions.

## 2.9 CAVITY INSULATION: Refer to Section 07200.

## 2.10 AIR/ VAPOR BARRIER: Refer to Section 07270.

### PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Wetting Clay Brick: Wet brick made from clay or shale which have ASTM C67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods which ensure each clay masonry unit being nearly saturated but surface dry when laid.
- B. Do not wet concrete masonry units.
- C. Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.
- D. Thickness: Build cavity and composite walls, floors and other masonry construction to the full thickness shown. Build single-wythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness indicated.
- E. Build chases and recesses as shown or required for the work of other trades. Provide not less than 8 inch of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.
- F. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.
- G. Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining work. Use full-size units without cutting where possible. No discoloration of units caused by cutting will be acceptable.

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- H. Pattern Bond:
  - 1. Brick: Running bond, unless otherwise shown.
  - 2. Concrete masonry units: Running bond, unless otherwise shown.
  - 3. Lay concealed masonry with all units in a wythe bonded by lapping not less than 2 inches.
- I. All concrete masonry units and courses below grade shall be filled solid with grout.

# 3.2 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4 inch in 10 feet, or 3/8 inch in a story height not to exceed 20 feet, nor ½ inch in 40 feet or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4 inch in any story or 20 feet maximum, nor ½ inch in 40 feet or more. For vertical alignment of head joints do not exceed plus or minus 1/4 inch in 10 feet, ½ inch maximum.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4 inch in any bay or 20 feet maximum, nor ½ inch in 40 feet or more. For top surface of bearing walls do not exceed 1/8 inch between adjacent floor elements in 10 feet or 1/16 inch within width of a single unit.
- C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed ½ inch in any bay or 20 feet maximum, nor 3/4 inch in 40 feet or more.
- D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch nor plus ½ inch.
- E. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to ½ inch. Do not exceed head joint thickness indicated by more than plus or minus 1/8 inch.

## 3.3 LAYING MASONRY WALLS

- A. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units at corners, jambs and wherever possible at other locations.
- B. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.
- C. Stopping and Resuming Work: Rack back <sup>1</sup>/<sub>2</sub>-unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.
- D. Built-in Work: As the work progresses, build-in items specified under this and other sections of these specifications. Fill in solidly with masonry around built-in items.

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- 1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
- 2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
- 3. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts and similar items, unless otherwise indicated.
- E. Extend all interior walls full height to underside of structure of deck, unless otherwise indicated. Include compressible insulation at top to completely close space between wall and structure above.
- F. Support and protect masonry, indicated to remain, which surrounds removal area.
  - 1. Refer to BIA, Technical Note #46: "Maintenance of Brick Masonry", <u>www.gobrick.com/Portals/25/docs/Technical%20Notes/TN46.pdf</u>, for two recommended methods to properly support existing brickwork when installing new mechanically keyed through wall flashing, and as indicated below:
    - a. <u>Method 1</u>: Remove alternate sections of masonry in 2'-0" to 5'-0" (610 mm to 1.52m) lengths.
    - b. <u>Method 2</u>: Temporary braces can be installed to permit the removal of longer sections of masonry.

<u>Note:</u> The replaced masonry should be properly cured (5 to 7 days) before the intermediate masonry sections or supports are removed.

### 3.4 MORTAR BEDDING AND JOINTING

- A. Lay solid brick size masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.
- B. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.
- C. Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8 inch joints.
- D. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, unless otherwise indicated.
- E. Tool exposed joints slightly concave using a jointer larger than joint thickness, unless otherwise indicated.
- F. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

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### 3.5 CAVITY WALLS

- A. Keep cavity clean of mortar droppings and other materials during construction. Strike joints facing cavity flush.
- B. Tie exterior wythe to back-up with continuous horizontal joint reinforcing, installed in mortar joints at not more than 16" o.c. vertically.
- C. Provide weep holes in exterior wythe of cavity wall located immediately above ledges and flashing, spaced 2'-0" o.c., unless otherwise indicated.
- D. Provide concealed flashing in cavity walls at all required locations and as indicated herein after.
- E. On units of plastic insulation, install small pads of mastic spaced approximately 1'-0" o.c. both ways on inside face, as recommended by manufacturer. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

## 3.6 AIR/ VAPOR BARRIER: Refer to Section 07270.

### 3.7 HORIZONTAL JOINT REINFORCEMENT

- A. Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcing a minimum of 6 inches.
- B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.
  - 1. Space continuous horizontal reinforcement as follows:
    - a. For multi-wythe walls (solid or cavity) where continuous horizontal reinforcement acts as structural bond or tie between wythes, space reinforcement as required by code but not more than 16 inches o.c. vertically.
    - b. For single-wythe walls, space reinforcement at 16" o.c. vertically, unless otherwise indicated.
  - 2. Cut reinforcement units at walls intersecting and/or abutting firewalls. Provide control joints with fire-rated sealant as indicated in Section 07900.
- D. Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcement placed in 2 horizontal joints approximately 8" apart, immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2'-0" beyond jambs of the opening except at control joints.

### 3.8 ANCHORING MASONRY WORK

- A. Provide anchoring devices of the type indicated. If not indicated, provide standard type for facing and back-up involved.
  - 1. Strap anchors for masonry at existing walls.

# 3.9 CONTROL AND EXPANSION JOINTS

- A. General: Provide vertical and horizontal expansion, control and isolation joints in masonry maximum 30 feet on center. Build-in related items as the masonry work progresses.
  - 1. Coordinate location of all control and expansion joints in the field with Architect prior to commencement of work.
- B. Build in joint fillers where shown: See Section 07900, Joint Sealers. Joint width for sealants: 3/8 inch unless otherwise indicated. Include straight joints at vertical recessed brick detail.

## 3.10 LINTELS

- A. Provide masonry lintels where shown and wherever openings of more than 1'-0" are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Precast lintels shall be scored to simulate adjacent blockwork. Cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.
- B. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

## 3.11 FLASHING OF MASONRY WORK

- A. <u>NOTE</u>: When Contractor must remove a portion of the existing masonry wall veneer in order to install through wall flashing or other work, the Contractor <u>MUST</u> follow the Brick Industry Association (Technical Note #46) and the Concrete Masonry Industry methodology to support and protect the existing adjacent masonry, indicated to remain, which surrounds removal area. The Contractor shall remove the proper length of masonry and leave adjacent masonry in place to support existing masonry above the work in lengths indicated below.
  - 1. Refer to BIA, Technical Note #46: "Maintenance of Brick Masonry", www.gobrick.com/Portals/25/docs/Technical%20Notes/TN46.pdf, for two recommended methods to properly support existing brickwork when installing new mechanically keyed through wall flashing, and as indicated below:
    - a. <u>Method 1</u>: Remove alternate sections of masonry in 2'-0" to 5'-0" (610 mm to 1.52m) lengths.
    - b. <u>Method 2</u>: Temporary braces can be installed to permit the removal of longer sections of masonry.

<u>Note:</u> The replaced masonry should be properly cured (5 to 7 days) before the intermediate masonry sections or supports are removed.

B. General: Provide concealed flashing in masonry work at, or above, shelf angles, lintels, ledges and the base of perimeter cavity walls and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior. Prepare masonry surfaces smooth and

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free from projections which could puncture flashing. Place through-wall flashing in wall and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar. Extend flashings through exterior face of masonry and turn down to form drip.

- 1. Contractor shall provide concealed flashing in masonry at all required conditions, whether shown or not, and shall be typical and/or similar for all building conditions when details and notes are shown on drawings.
- 2. Contractor shall provide spandrel beam membrane flashings for all steel beams exposed to cavity, whether shown or not, and shall be typical and/or similar for all building conditions when details and notes are shown on drawings.
- C. Extend flashing the full length of ledges. Lap all flashing a minimum of 4 inches and seal laps with mastic or as recommended by manufacturer. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 8 inches, and through the inner wythe to within third of width of the inner wythe as indicated on drawings.
- D. Extend flashing the full length of lintels and shelf angles and minimum of 4 inches into masonry each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 8 inches, and through the inner wythe to within 1/2" of the interior face of the wall in exposed work. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches.
  - 1. At heads and sills flashing shall extend 6 inches beyond each side of the opening and to be turned up at the sides/ends not less than 2 inches to form a pan, (end dam). All corners shall be folded, not cut.
- E. Lap all flashing a minimum of 4 inches and seal laps with mastic or as recommended by manufacturer.
- F. Provide weep holes in the head joints of the same course of masonry bedder in the flashing mortar. Space 24 inches o.c., unless otherwise indicated.
- G. Install reglets and nailers for flashing and other related work where shown to be built into masonry work.

# 3.12 QUALITY CONTROL TESTING

- A. Engage an independent testing and inspection agency to inspect engineered masonry and to perform tests and prepare test reports.
  - 1. Perform tests for condition, size, location and spacing of reinforcement and anchorage of engineered masonry assemblies.
- B. Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with design requirements and indicated standards, and specifically state any deviations therefrom.
  - 1. Provide access for testing agency to places where structural steel reinforcement and anchorage work is being fabricated or produced so that required inspection and testing can be accomplished.

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- 2. Testing agency may inspect structural steel reinforcement and anchorage work at plant before shipment; however, Architect reserves right, at any time before final acceptance, to reject material not complying with specified requirements.
- C. Correct deficiencies in structural steel reinforcement and anchorage work which inspections and laboratory test reports have indicated to be not in compliance with requirements.
  - 1. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.

## 3.13 REPAIR, POINTING AND CLEANING

- A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings and adjacent work to provide a neat, uniform appearance, prepared for application of sealants.
- C. Clean exposed brick masonry surfaces by the bucket and brush hand cleaning method or by high pressure water method. Comply with requirements of BIA Technical Notes No. 20 "Cleaning Brick Masonry".
  - 1. Use commercial cleaning agents in accordance with manufacturer's instructions.
- D. Clean exposed CMU masonry by dry brushing at the end of each day's work and after final pointing to remove mortar spots and droppings. Comply with recommendations in NCMA TEK Bulletin No. 28.
  - 1. Prepare exposed to view CMU surfaces to receive paint coatings in accordance with Section 09900.

### **END OF SECTION 04200**

## SECTION 05400 - MISCELLANEOUS STRUCTURAL STEEL

### 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 DESCRIPTION OF WORK**

- A. Definition: Miscellaneous structural steel includes items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of Structural Steel or other metal fabrication systems specified elsewhere.
- B. Extent of miscellaneous structural steel fabrications is indicated on drawings and schedules.
  - 1. Work of this section shall include miscellaneous structural steel framing and supports for wall and roof openings whether <u>or not</u> shown on the Drawings.
    - a. Refer to architectural, mechanical and electrical drawings for the following:
      - 1) Locations and sizes of roof penetrations, roof top supported mechanical, etc.
      - 2) Locations and sizes of wall penetrations, wall chases, louvers, duct penetrations, etc.
    - b. All miscellaneous structural steel supports shall be in accordance with typical structural steel details and schedules shown on Architectural Drawings and/or as directed by the Architect.
    - c. All miscellaneous structural steel supports shall meet indicated load requirements and/or as directed by the Architect.
    - d. In existing building(s) where alteration and/or renovation work is/are indicated, refer to Division 1 Sections for miscellaneous structural steel framing and supports which <u>may be</u> assigned to be provided and installed by other Trades.
- C. Types of work in this section include metal fabrications for:
  - 1. Loose Steel lintels, bearing and leveling plates and miscellaneous steel framing and supports.
- D. Related Sections:
  - 1. Section 01400 Testing Laboratory Service
  - 2. Section 04200 Unit Masonry
  - 3. Section 05500 Metal Fabrications
  - 4. Section 09900 Painting
  - 5. Division 23 Mechanical Work

### 1.3 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrications might delay work.

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- B. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Delegated Design:
  - 1. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Bid Documents, provide products and systems complying with specific performance and design criteria indicated. Design and Design includes, but is not limited to:
    - a. Miscellaneous steel framing, metal framing, clips, brackets, bearing plates and other components.
  - 2. Professional Engineer Qualifications: A professional engineer legally authorized to practice in the jurisdiction where the Project is located, (State of New Jersey), and experienced in providing engineering services of the kind indicated that have resulted in the installation of structural assemblies, similar to this Project in material, design, and extent and that has a record of successful in-service performance. Provide analysis data and signed & sealed documents.
  - 3. Conform to all applicable State and Local Codes for design loads and all other requirements.
  - 4. Refer to paragraph 1.4 SUBMITTALS (below).
- D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code-Steel," and AWS D1.3, "Structural Welding Code-Sheet Steel."

## 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's Specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.
- B. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous steel fabrications. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.
  - 1. Submit shop drawings for miscellaneous steel framing and supports. Signed and sealed shop drawings shall be submitted by a qualified professional Structural Engineer, licenced in the state where the project is located
- C. Where materials or fabrications are indicated to comply with certain requirements for design loadings, include structural computations, material properties and other information needed for structural analysis.
- D. Samples: Submit 2 sets of representative samples of materials and finished products as may be requested by Architect.

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### PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Metal Surfaces, General: For fabrication of miscellaneous structural steel work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
- B. Steel
  - 1. Steel Plates, Shapes and Bars: ASTM A36.
  - 2. Steel Tubing: Cold-formed, ASTM A500; or hot-rolled, ASTM A501.
  - 3. Structural Steel Sheet: Hot-rolled, ASTM A570; or cold-rolled ASTM A611, Class 1; of grade required for design loading.
  - 4. Galvanized Structural Steel Sheet: ASTM A446, of grade required for design loading. Coating designation as indicated, or if not indicated, G90.
  - 5. Steel Pipe: ASTM A53; Type and grade (if applicable) as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (schedule 40), unless otherwise indicated.
  - 6. Gray Iron Castings: ASTM A48, Class 30.
  - 7. Malleable Iron Castings: ASTM A47, grade as selected by fabricator
- C. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
- D. Grout:
  - 1. Metallic Non-Shrink Grout: Pre-mixed, factory-packaged, ferrous aggregate grout complying with CE CRD-C588, Type M.
  - 2. Non-Shrink Non-Metallic Grout: Pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with CE CRD-C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.
- E. Fasteners:
  - 1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
  - 2. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
  - 3. Lag Bolts: Square head type, FS FF-B-561.
  - 4. Machine Screws: Cadmium plated steel, FS FF-S-92.
  - 5. Wood Screws: Flat head carbon steel, FS FF-S-111.
  - 6. Plain Washers: Round, carbon steel, FS FF-W-92.
  - 7. Masonry Anchorage Devices: Expansion shields, FS FF-S-325.

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- F. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.
  - 1. Lock Washers: Helical spring type carbon steel, FS FF-W-84.
- G. Paint:
  - 1. Surface Preparation: SSPC-2P6 commercial Blast Cleaning.
  - 2. Primer: Tnemec Series 90-97 Tneme-Zinc, or equal, @ 2.5 3.5 mils (dry)
  - 3. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Section 09900.

# 2.2 FABRICATION, GENERAL

- A. Workmanship: Use materials of size and thickness indicated, or if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of work.
- B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- C. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts.
- E. Provide for anchorage of type indicated, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
- F. Galvanizing:
  - 1. Provide a zinc coating for exterior items and those items indicated or specified to be galvanized, as follows:
    - a. ASTM A 153 for galvanizing iron and steel hardware.
    - b. ASTM A 123 for galvanized rolled, pressed and forged steel shapes, plates, bars and strip 1/8" thick and heavier.
    - c. ASTM A 386 for galvanizing assembled steel products.
- G. Shop Painting
  - 1. Shop paint miscellaneous structural steel, except members or portions of members to be embedded in masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise indicated.

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- 2. Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-6.
- 3. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.
- 4. Apply one shop coat to fabricated metal items, except apply two coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

## PART 3 - EXECUTION

## 3.1 **PREPARATION**

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as miscellaneous items having integral anchors, which are to be embedded in masonry construction. Coordinate delivery of such items to project site.
  - 1. Coordinate work of this section with other work affected by other Trades.
  - 2. Obtain locations, opening sizes, weighs and other required information from affected trades.
  - 3. Comply with coordination requirements indicated in Division 1 Sections.

## 3.2 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors, as required.
- B. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plus, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into masonry or similar construction.
- C. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- D. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.

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E. Set loose lintels weighing more than 200 pounds, leveling and grouting as for plates. Deliver loose lintels weighing less than 200 pounds to the General Construction Contractor, allow sufficient time for scheduling the installation.

## 3.3 ADJUST AND CLEAN

- A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting.
- B. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- C. For galvanize surfaces: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

### END OF SECTION 05400

## **SECTION 05500 - METAL FABRICATIONS**

#### 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 DESCRIPTION OF WORK**

- A. Definition: Metal fabrications include items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere and non-ferrous items listed herein.
- B. Type of work in this section includes metal fabrications for assemblies which include but are not limited to the following:
  - 1. Rough hardware.
  - 2. Miscellaneous structural shapes.
  - 3. Post installed anchors.
- C. Related Work:
  - 1. Section 03300 Concrete Work.
  - 2. Section 04200 Unit Masonry.
  - 3. Section 05400 Miscellaneous Structural Steel.
  - 4. Section 09900 Painting.

#### 1.3 QUALITY ASSURANCE

A. Codes and Standards:

ASTM A108-99 - Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality.

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

ASTM A276-03 - Standard Specification for Stainless Steel Bars and Shapes.

ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

ASTM A563-00 - Standard Specification for Carbon and Alloy Steel Nuts.

ASTM A569/A569M-91a – Standard Specification for Steel, Carbon (.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality (superseded by A1011).

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ASTM A780-01 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

ASTM A1011/A1011M-03 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

ASTM F844-00 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

AWS D1.1/D1.1M: Structural Welding Code - Steel, Welding qualification procedures and personnel.

- B. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrications might delay work.
- C. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- D. Delegated Design Engineer Qualifications: A professional engineer who is legally qualified to practice in New Jersey where Project is located and who is experienced in providing engineering services of the type indicated.

## 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.
- B. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous metal fabrications. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.
- C. Where materials or fabrications are indicated to comply with certain requirements for design loadings, include structural computations, material properties and other information needed for structural analysis.
- D. Samples: Submit 2 sets of representative samples of materials and finished products as may be requested by Architect.
- E. Mill test reports: Reports indicating metals to be furnished comply with project requirements.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

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- B. Aluminum: Comply with the following standards for the forms and types of aluminum for the required items of work.
  - 1. Alloy and Temper: Provide alloy and temper as recommended by the aluminum producer or finisher, with not less than the strength and durability properties specified in ASTM B 632/B 632 M, alloy 6061-T6.
  - 2. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of the metal to be welded, and as required for color match, strength and compatibility in the fabricated items.
  - 3. Fasteners: Finish of basic metal and alloy, matching finished color and texture as the metal being fastened, unless otherwise indicated. Unless otherwise shown, provide Phillips flat-head screws for exposed fasteners.
  - 4. Bituminous Paint: SSPC-Paint (cold-applied asphalt mastic).
  - 5. Protective Lacquer: Clear non-yellowing, of type recommended by metal producer for protection of the finished metal surfaces.
  - 6. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
  - 7. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.
  - 8. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.
- C. Steel
  - 1. Steel Plates, Shapes and Bars: ASTM A36/A 36M.
  - 2. Steel Tubing: Cold-formed, ASTM A500; or hot-rolled, ASTM A501.
  - 3. Structural Steel Sheet: Hot-rolled, ASTM A570; or cold-rolled ASTM A611, Class 1; of grade required for design loading.
  - 4. Galvanized Structural Steel Sheet: ASTM A446, of grade required for design loading. Coating designation as indicated, or if not indicated, G90.
- D. Gray Iron Castings: ASTM A48, Class 30.
- E. Malleable Iron Castings: ASTM A47, grade as selected by fabricator.
- F. Stainless Steel Sheet, Strip, Plate and Flat Bars: ASTM A666, Type 304, unless otherwise indicated.
  - 1. Stainless Bars and Shapes: ASTM A276, Type 304.
- G. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

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- H. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.
- I. Grout:
  - 1. Non-Shrink, Metallic Grout: Pre-mixed, factory-packaged, ferrous-aggregate grout complying with CE CRD-C588, Type M, and ASTM C1107, specifically recommended by manufacturer for heavy-duty loading applications and not to be used in wet areas or on exterior applications.
  - 2. Non-Shrink, Non-Metallic Grout: Pre-mixed, factory-packaged, non-staining, noncorrosive, non-gaseous grout complying with CE CRD-C621, and ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.
- J. Fasteners:
  - 1. General: Provide zinc-plated fasteners complying with ASTM B633, Class Fe/Zn 5, for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
  - 2. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A, with hex nuts, ASTM A563; and where needed, flat washers.
  - 3. Weathering Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A325, Type 3, with hex nuts, ASTM A563, Grade C3; and where needed, flat washers.
  - 4. Lag Screws: Square head type, ASME B18.2.1.
  - 5. Machine Screws: Cadmium plated steel, ASME B18.6.3.
  - 6. Wood Screws: Flat head, carbon steel, ASME B18.6.1.
  - 7. Plain Washers: Round, carbon steel, ASME B18.22.1.
  - 8. Masonry Anchorage Devices: Expansion shields, FS FF-S-325.
  - 9. Expansion Anchors: Anchor bolt and sleeve assembly; Carbon-steel components zincplated to comply with ASTM B633, Class Fe/Zn 5.
  - 10. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as needed.
  - 11. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.
  - 12. Anchor Bolts: ASTM F 1554, Grade 36, of dimension indicated; with nuts, ASTM A563; and where indicated, flat washers.
- K. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488, conducted by a qualified independent testing agency.

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- L. Cast-in-Place in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329.
- M. Post-Installed Anchors:
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633, Class Fe/Zn 5, unless otherwise indicated.
  - 2. Material for Exterior Locations and where Stainless Steel is indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F593 and nuts, ASTM F594.
- N. Paint:
  - 1. Metal Primer Paint: Red lead mixed pigment, alkyd varnish, linseed oil paint, FS TT-P-86l, Type II; or red lead iron oxide, raw linseed oil, alkyd paint, Steel Structures Painting Council (SSPC) Paint 2-64; or basic lead silico chromate base iron oxide, linseed oil, alkyd paint, FS TT-P-615, Type II.
  - 2. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Section 09900.
  - 3. Galvanizing Repair Paint: High-zinc-dust content paint for regalvanizing welds in galvanized steel, complying with the Military Specifications MIL-P-21035 (Ships) or SSPC-Paint-20 and compatible with paints specified to be used over it.

### 2.2 FABRICATION, GENERAL

- A. Workmanship
  - 1. Use materials of size and thickness indicated, or if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of work.
  - 2. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
  - 3. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
  - 4. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts.
  - 5. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

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- 6. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
- B. Galvanizing:
  - 1. Provide a zinc coating for exterior steel items and those items indicated or specified to be galvanized, as follows:
    - a. ASTM A 153 for galvanizing iron and steel hardware.
    - b. ASTM A 123 for galvanized rolled, pressed and forged steel angles, corner guards, other indicated shapes, plates, bars, bollards and strip 1/8" thick and heavier.
    - c. ASTM A 386 for galvanizing assembled steel products.
- C. Shop Painting
  - 1. Shop paint miscellaneous metal work, except members of portions of members to be embedded in masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise indicated.
  - 2. Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-2 "Hand Tool Cleaning", or SSPC SP-3 "Power Tool Cleaning", or SSPC SP-7 "Brush-Off Blast Cleaning".
  - 3. Remove oil, grease and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning".
  - 4. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions, and at a rate to provide uniform dry film thickness of 2.0 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.
  - 5. Apply one shop coat to fabricated metal items, except apply two (2) coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

### 2.3 MISCELLANEOUS METAL FABRICATIONS

- A. Rough Hardware
  - 1. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items as specified in Division-6 sections.
  - 2. Fabricate items to sizes, shapes and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.
- B. Miscellaneous Structural Shapes, Framing and Supports, Etc.

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- 1. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.
- 2. Fabricate miscellaneous units to sizes, shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise indicated, fabricated from structural steel shapes, plates and steel bars of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.
- 3. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
- 4. Galvanize exterior miscellaneous frames and supports.

# 2.4 MISCELLANEOUS MATERIALS

- A. Injectable Mortar: Provide and install injectable mortar at all post-installed anchors, as follows:
  - 1. Except where indicated on the drawings, post-installed anchors shall consist of the following anchor types as provided by Hilti, Inc.; or approved equal.
    - a. Anchorage to Concrete
      - 1) Adhesive anchors for cracked and uncracked concrete:
        - a) Hilti HIT-HY 200 Safe Set System with Hilti HIT-Z ROD per ICC ESR-3187.
        - b) Hilti HIT-HY 200 Safe Set System with Hilti Hollow Drill Bit System with HAS-E threaded rod per ESR-3187.
        - c) Hilti HIT-RE 500-SD Epoxy Adhesive Anchoring System with HAS-E Threaded Rod per ICC ESR-2322 for slow cure applications.
      - 2) Medium duty mechanical anchors for cracked and uncracked concrete:
        - a) Hilti KWIK HUS-EZ and KWIK HUS EZ-I Screw Anchors per ICC ESR-3027.
        - b) Hilti KWIK BOLT-TZ Expansion Anchors per ICC ESR-1917.
        - c) Hilti KWIK BOLT 3 Expansion Anchors (uncracked concrete only) per ICC ESR-2302.
      - 3) Heavy Duty mechanical anchors for cracked and uncracked concrete:
        - a) Hilti HDA Undercut Anchors per ICC ESR 1546.
        - b) Hilti HSL-3 Expansion Anchors per ICC ESR 1545.
    - b. Rebar Doweling into Concrete
      - 1) Adhesive anchors for cracked and uncracked concrete use:
        - a) Hilti HIT-HY 200 Safe Set System with Hilti Hollow Drill Bit System with continuously deformed rebar per ICC ESR-3187.
        - b) Hilti HIT-RE 500-SD Epoxy Adhesive Anchoring System with continuously deformed rebar per ICC ESR-2322.
    - c. Anchorage to Solid Grouted Masonry
      - 1) Adhesive Anchors:
        - a) Hilti HIT-HY 70 Masonry Adhesive Anchoring System (ICC pending).
        - b) Steel anchor element shall be Hilti HAS-E Continuously Threaded Rod or continuously deformed steel rebar.
      - 2) Mechanical Anchors:
        - a) Hilti KWIK HUS-EZ Screw Anchor per ICC ESR-3056.
        - b) Hilti KWIK BOLT-3 Expansion Anchors per ICC ESR-1385.

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- d. Anchorage to Hollow/Multi-Wythe Masonry
  - 1) Adhesive Anchors:
    - a) Hilti HIT-HY 70 Masonry Adhesive Anchoring System per ICC ESR-3342.
    - b) Steel anchor element shall be Hilti HAS-E Continuously Threaded Rod or continuously deformed steel rebar.
    - c) The appropriate size screen tube shall be used per adhesive Manufacturer's recommendation.
- 2. Anchor capacity used in design shall be based on the technical data published by Hilti or such other method as approved by the Architect/Structural Engineer. Substitution requests for alternate products must be approved in writing by the Architect/Structural Engineer. Contractor shall provide calculations demonstrating that the substituted product is capable of achieving the performance values of the specified product. Substitutions will be evaluated by their having an ICC ESR showing compliance with the relevant building code for seismic uses, load resistance, installation category, and availability of comprehensive installation instructions. Adhesive anchor evaluation will also consider creep, in-service temperature and installation temperature.
- 3. Install anchors per the manufacturer instructions, as included in the anchor packaging.
- 4. Overhead adhesive anchors must be installed using the Hilti Profi System.
- 5. The Contractor shall arrange an anchor manufacturer's representative to provide onsite installation training for all of their anchoring products specified. The Architect/Structural Engineer must receive documented confirmation that all of the Contractor's personnel who install anchors are trained prior to the commencement of installing anchors.
- 6. Anchor capacity is dependant upon spacing between adjacent anchors and proximity of anchors to edge of concrete. Install anchors in accordance with spacing and edge clearances indicated on the drawings.
- 7. Existing reinforcing bars in the concrete structure may conflict with specific anchor locations. Unless noted on the drawings that the bars can be cut, the Contractor shall review the existing structural drawings (if available) and shall undertake to locate the position of the reinforcing bars at the locations of the concrete anchors, by Hilti Ferroscan, GPR, X-Ray, chipping or other means.

# PART 3 - EXECUTION

## 3.1 **PREPARATION**

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

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## 3.2 INSTALLATION

## A. General

- 1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, throughbolts, lag bolts, wood screws and other connectors as required.
- 2. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plus, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
- 3. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- 4. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.
- B. Setting Loose Lintels and Plates:
  - 1. Clean masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.
  - 2. Set Loose Lintels, leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut-off flush with the edge of the bearing plate before packing with grout. Use metallic non-shrink grout in concealed locations where not exposed to moisture; use non-metallic non-shrink grout in exposed locations, unless otherwise indicated.
  - 3. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

# 3.3 ADJUST AND CLEAN

- A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.8 mils.
- B. For galvanize surfaces: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint.

# END OF SECTION 05500

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## SECTION 06100 - CARPENTRY

## PART 1 - GENERAL

## 1.1 **RELATED DOCUMENTS**

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

## 1.2 SUMMARY

- A. Type of work in this section includes rough carpentry for:
  - 1. Dimensional lumber,
  - 2. Wood nailers and blocking,
  - 3. Rough hardware,
  - 4. Construction panels.

## 1.3 SUBMITTALS

- A. Material Certificates: Where dimensional lumber is provided to comply with minimum allowable unit stresses, submit listing of species and grade selected for each use, and submit evidence of compliance with specified requirements. Compliance may be in form of a signed copy of applicable portion of lumber producer's grading rules showing design values for selected species and grade. Design values shall be as approved by the Board of Review of American Lumber Standards Committee.
- B. Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installation and finishing of treated material.
- C. Fire-Retardant Treatment: Include certification by treating plant that treated material complies with specified standard and other requirements.

# 1.4 **PRODUCT HANDLING**

- A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.
- B. Do not deliver finish carpentry materials, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforseen circumstances, finish carpentry materials must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

# 1.5 **PROJECT CONDITIONS**

A. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow attachment of other work.

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B. Maintain temperature and humidity in installation areas as required to maintain moisture content of installed finish carpentry within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and required temperature and humidity conditions.

# PART 2 - PRODUCTS

# 2.1 LUMBER, GENERAL

- A. Lumber Standards: Manufacture lumber to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.
- B. Inspection Agencies: Inspection agencies and the abbreviations used to reference with lumber grades and species include the following:

WWPA - Western Wood Products Association.

- C. Factory-mark each piece of lumber with type, grade, mill and grading agency, except omit marking from surfaces to be exposed with transparent finish or without finish.
- D. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.
- E. Provide dressed lumber, S4S, unless otherwise indicated.
- F. Provide seasoned lumber with 19 percent maximum moisture content at time of dressing.

## 2.2 **DIMENSION LUMBER**

- A. For light framing (2" to 4" thick, 2" to 4" wide) provide the following grade and species:
  - 1. Construction grade: Any species of specified grade.
- B. For exposed framing lumber provide material complying with the following requirements:
  - 1. Definition: Exposed framing refers to dimension lumber which is not concealed by other work and is indicated to receive a stained or natural finish.
  - 2. Grading: Hand select material at factory from lumber of species and grade indicated below for compliance with "Appearance" grade requirements of ALSC National Grading Rule; issue inspection certificate of inspection agency for selected material.
  - 3. Same species and grade as indicated for structural framing.

## 2.3 MISCELLANEOUS LUMBER

A. Provide wood for support or attachment of other work including cant strips, nailers, blocking, furring, grounds, stripping and similar members. Provide lumber of sizes indicated, worked into shapes shown, and as follows:

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- 1. Moisture content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- 2. Grade: Construction Grade light framing size lumber of any species or board size lumber as required. Provide construction grade boards or No. 2 Boards.

# 2.4 CONSTRUCTION PANELS

- A. Construction Panel Standards: Comply with PS 1 "U.S. Product Standard for Construction and Industrial Plywood" for plywood panels and, for products not manufactured under PS 1 provisions, with American Plywood Association (APA) "Performance Standard and Policies for Structural-Use Panels", Form No. E445.
- B. Trademark: Factory-mark each construction panel with APA trademark evidencing compliance with grade requirements.
- C. Concealed APA Performance-Rated Panels: Where construction panels will be used for the following concealed types of applications, provide APA Performance-Rated Panels complying with requirements indicated for grade designation, span rating, exposure durability classification, edge detail (where applicable) and thickness.
- D. APA RATED SHEATHING
  - 1. Exposure Durability Classification: EXTERIOR.
    - a. Span Rating: As required to suit joist spacing indicated.
- E. Fire-Retardant-Treated 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 (3.2 m) beyond the centerline of the burners at any time during the test.
  - 1. Treatment shall not promote corrosion of metal fasteners.
  - 2. 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.
  - 3. 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.
  - 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841.
    - a. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.

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F. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant treated plywood panels with grade designation, APA C-D PLUGGED INT with exterior glue, in thickness indicated, or, if not otherwise indicated, not less than 15/32".

## 2.5 MISCELLANEOUS MATERIALS

- A. Fasteners and Anchorages: Provide size, type, material and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.
- B. Where rough carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating (ASTM A 153).
- C. Building Paper: ASTM D 226, Type I; asphalt saturated felt, non-perforated, 15-lb. type.

# 2.6 WOOD TREATMENT BY PRESSURE PROCESS

- A. Fire-Retardant Treatment: Where fire-retardant treated wood ("FRT") is indicated or required, pressure impregnate lumber and plywood with fire-retardant chemicals to comply with AWPA C20 and C27, respectively, identify "FRT" lumber with appropriate classification marking of Underwriters Laboratories, Inc., U.S. Testing, Timber Products Inspection or other testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Fire treated wood shall have a flame spread of 25 or less and shall be dried to 19% moisture content for lumber and 15% for plywood. Exposed wood or wood subject to high humidity conditions shall be identified that the moisture content shall not exceed 28% when tested at 92% relative humidity in accordance with ASTM D3201.
  - 2. Treatment products: The following products, provided they comply with requirements of the contract documents will be among those considered acceptable:
    - a. "Dricon"; Hickson Corporation.
    - b. "Flame Proof LHC"; Osmose Wood Preserving, Inc.
    - c. "Pyro-Guard"; Hoover Treated Wood Products, Inc.
    - d. Or approved equal.
  - 3. Treat members shown on drawings and/or as required to meet the code requirements.

## PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- B. Set carpentry work to required levels and lines, with members plumb and true to line and cut and fitted.

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- C. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards.
- D. Countersink nail heads on exposed carpentry work and fill holes.
- E. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

## 3.2 WOOD NAILERS AND BLOCKING

- A. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
- B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
- C. Height of nailers shall be matched to that of the insulation being used. Nailers shall be firmly anchored to the deck to resist a force of seventy-five pounds per lineal foot. The type of anchors shall be as recommended by the roofing manufacturer and shall be secured at intervals required to ascertain a resistance force of seventy-five pounds per lineal foot.

# 3.3 INSTALLATION OF CONSTRUCTION PANELS

- A. General: Comply with applicable recommendations contained in Form No. E 30F, "APA Design/Construction Guide Residential & Commercial," for types of construction panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Sheathing: Screw to framing or substrates.

## END OF SECTION 06100

# SECTION 06650 - SOLID POLYMER FABRICATIONS

## 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. Plastic window stools.
  - 2. Countertops.

## 1.3 SUBMITTALS

- A. Product Data: Written technical information for unit specified. Indicate product description, fabrication information and compliance with specified performance requirements.
- B. Shop Drawings:
  - 1. Submit rough-in drawings. Include the following details and all other information necessary to demonstrate compliance with contract documents:
    - a. Dimensions.
    - b. Required clearances.
    - c. Methods of assembling components.
    - d. Anchorages.
    - e. Coordination requirements with adjacent work.
- C. Samples: Submit minimum 2 inch by 2 inch samples. Indicate full range of colors and pattern variation. Approved samples will be retained as a standard for work.
- D. Certificates: Submit certification that work complies with requirements of contract documents.
- E. Manufacturer's Instructions: Submit for each product specified in this section.
  - 1. Include installation instructions and instructions for examination, preparation, and protection of adjacent work.
- F. Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions and maintenance video.
  - 1. Provide maintenance kit for indicated finishes. Include in project close-out documents.

## 1.4 DELIVERY, STORAGE AND HANDLING:

A. Deliver no components to project site until areas are ready for installation. Store indoors.

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B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

# 1.5 QUALITY ASSURANCE:

A. Allowable Tolerances: Variation in component size:  $\pm 1/8$  inch.

## 1.6 WARRANTY:

- A. Provide manufacturer's warranty against defects in materials, fabrication and installation, excluding damages caused by physical or chemical abuse or excessive heat. Warranty shall provide for replacement or repair of material and labor for a period of **ten (10) years**, beginning at Date of Substantial Completion.
  - 1. For fabrications with installed warranty coverage, identify by affixing manufacturer's fabrication/installation source plate.

## PART 2 - PRODUCTS

## 2.1 SOLID POLYMER FABRICATIONS:

- A. Basis of Design: Corian Surfaces as manufactured by Du Pont De Nemours & Co., Inc.; or approved equal.
- B. Subject to compliance with indicated requirements manufacturers offering products which may be incorporated in the work include the following:
  - 1. Meganite Inc.: Manufacturer's Rep: Richelieu Hardware,
  - 2. LG Solid Surfaces,
  - 3. Wilsonart: Manufacturer's Rep: Fessenden Hall Inc.,
  - 4. Avonite Surfaces,
  - 5. Or approved equal.
- C. Material: Cast, filled, acrylic; not coated, laminated or of composite construction, meeting ANSI Z124 1980, Type Six, and FS WW-P-541E/GEN dated August 1, 1980.

# 2.2 **PERFORMANCE CHARACTERISTICS:**

REQUIREMENT	TEST PROCEDURE	
(mm/max)		
5000 psi min	ASTM D638	
1.0 x 10 <sup>6</sup> psi min	ASTM D638	
7000 psi min	ASTM D790	
$1.0 \times 10^{6}$	ASTM D790	
0.3% min.	ASTM D638	
0.8% min.	ASTM D638	
	<b>REQUIREMENT</b> (min/max)         5000 psi min $1.0 \times 10^6$ psi min         7000 psi min $1.0 \times 10^6$ $0.3\%$ min. $0.8\%$ min.	

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Hardness	90-Rockwell "M" scale 52-Barcol Impressor min.	ASTM D758	
Thermal Expansion	$3.5 \times 10^{-6}$ in/in/deg C max 1.95 x 10 <sup>-6</sup> in/in/deg F max	ASTM D696	
Color Stability	No change, min. 100 hours	NEMA LD3-3.10	
Wear and Cleanability	Passes	ANSI Z124.3	
Abrasion Resistance	No loss of pattern Weight loss (1000 cycles)=0.9 g. max.	NEMA LD3-3.01 ANSI Z124.3	
Boiling water Surface Resistance	No Change	NEMA LD3-3.05	
High Temperature Resistance	No Change	NEMA LD3-3.06	
Conductive Heat Resistance	No Change	NEMA LD3-3.08	
Impact Resistance Notched Izod Gardner	t Resistance ed Izod 0.24 ftlbs./in. of notch min. er 9.0 ft-lbs min.		
Ball drop 1/4" sheet 1/2" sheet 3/4" sheet	36" min. with 1/2 lb ball, no failure 140" min. with 1/2 lb ball, no failure 200" min. with 1/2 lb ball, no failure	NEMA LD3-303	
Stain Resistance	Passes	ANSI Z124.3	
Weatherability	No change, min. 1000 hours	ASTM D1499-84 ours	
Fungi and Bacteria	No Attack	No Attack ASTM G21, ASTM G22	
Specific Gravity	1.6 min.		

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Water Absorption	24 hrs.	Long To	erm	ASTM D570
(% max.)	0.05 (1/4") ma 0.10 (3/4") ma	x. 0.50 (1) x. 0.90 (3)	0.50 (1/4") max. 0.90 (3/4") max.	
Flammability		Solid Colore		ASTM E84
	1/4"	1/2"	3/4"	
Flame spread	25 max	25 max	25 max	
Smoke Developed	30 max	30 max	30 max	
Class	1	1	1	
	Par	ticulate Patterns		
	1/4"	1/2"	3/4"	
Flame spread	25 max	25 max	25 max	
Smoke Developed	30 max	30 max	30 max	
Class	1	1	1	
Pittsburgh Protocol (as used by NY stat	Toxicity soli re) par	ds-80 grams min. ticulate patterns-65 grams min.	"LC	50" Test

## 2.3 ACCESSORY PRODUCTS

- A. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, nonporous joints by chemical bond.
- B. Panel Adhesive: Manufacturer's standard neoprene-based panel adhesive complying with ANSI A136.1-1967, UL listed.
- C. Sealant: Manufacturer's standard mildew-resistant, FDA, UL listed silicone sealant in colors matching components.

# 2.4 FABRICATION:

A. Factory fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed Instructions and technical bulletins.

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- B. Form joints between components using manufacturer's standard joint adhesive; without conspicuous joints. Reinforce with strip of solid polymer material, 2" wide.
- C. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Repair or reject defective and inaccurate work.
- D. <u>Window Stools</u>: 1/2 inch thick solid polymer material, adhesively joined with inconspicuous seams, having round edge, 1" thick minimum and with 1" minimum projection from face of wall, unless otherwise shown on the Drawings.
  - 1. Provide surfaces with a uniform finish, Matte, Gloss range of 5-20. Color to be selected from manufacturer's Color Group 1 5.
- E. <u>Countertops</u>: 1/2-inch thick solid polymer material, adhesively joined with inconspicuous seams, edge as indicated on the drawings, unless otherwise shown on the Drawings.
  - 1. Provide surfaces with a uniform finish, Matte, Gloss range of 5-20. Color to be selected from manufacturer's Color Group 1 5.

## **PART 3 - EXECUTION**

## 3.1 GENERAL REQUIREMENTS

- A. Prior to final approval of shop drawings, erect at project site one full size mock-up of each component required, for Architect's review.
- B. Should mock-up not be approved, re-fabricate and reinstall until approval is secured. Remove rejected units from project site.
- C. Approved mock-ups may remain as part of finished work.

## 3.2 INSTALLATION

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
- B. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Reinforce joints as required.
- C. Perform installation in accordance with manufacturer's instructions, except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.

## 3.3 CLEANING

A. Clean shop finished surfaces, touch-up as required, and remove or refinish damaged or soiled areas, as acceptable to Architect.

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# 3.4 **PROTECTION**

A. Contractor to take all precautions as recommended by the manufacturer for protection of installed window stools and other solid plastic products from damage by work of other trades.

# **END OF SECTION 06650**

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# SECTION 07070 - SELECTIVE ROOF DEMOLITION

## 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 GENERAL

- A. The Contractor will be responsible for the removal and disposal of all materials generated from work of this Contract.
- B. Provide all labor, material, equipment, and tools as required to prepare the existing roof section for selective demolition work and installation of new RTU curbs, vents, etc. as specified in this Section and other Division 7 Sections.
- C. Provide for the proper disposal of all existing materials designated to be removed. Use approved trash receptacles in areas designated by the Owner's Representative.
- D. Coordinate work, in such a manner as to keep the new insulation and roofing materials, building, and building interior absolutely clean, dry and watertight.
- E. Contractor is to maintain the building roof in a watertight condition at the completion of each day's work and ensure that no water enters into the building. Roof areas are to be "watertight at night" at all times during the job. Failure to do so is grounds for dismissal. Contractor will reimburse Owner the cost to repair interior damages resulting from roof leaks during construction.
- F. Contractor is to maintain the building and site in a neat and orderly fashion at all times. Completely remove all scrap and debris on a daily basis. Failure to do so is grounds for dismissal.

## 1.3 SUBMITTALS

- A. Proposed Selective Demolition Activities:
  - 1. Submit proposed schedule of demolition activities. Indicate:
    - a. Starting and ending dates for each activity as appropriate.
    - b. Interruption and restoration of utility services.
  - 2. Submit proposed methods of operations.
- B. Project Record Documents:
  - 1. Indicate unanticipated structural, electrical, or mechanical conditions.
- C. Photographs: Before starting work, file with the Architect photographs documenting existing conditions that later could be mistaken for damage caused by demolition operations.

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# 1.4 **PROJECT CONDITIONS**

- A. Occupancy:
  - 1. The Owner will continue to occupy portions of the existing building.
- B. Unforeseen Conditions:
  - 1. Should unforeseen conditions be encountered that affect design or function of project, investigate fully and submit an accurate, detailed, written report to the Owner / Architect. While awaiting the Owner / Architect's response, reschedule operations if necessary to avoid delay of overall project.

## PART 2

## 2.1 EQUIPMENT

A. Demolition equipment and materials are provided by the Contractor.

## PART 3

## 3.1 **EXECUTION**

- A. Contractor shall take all necessary precautions during roof preparation work to protect the building exterior, building interior, and adjacent surfaces from being soiled or damaged.
- B. When weather threatens, cease work under this Section and return roof to a watertight condition.
- C. Contractor shall restore to original condition any damages caused during work on this project. Damages found on this project prior to start of work must be documented by Contractor and brought to Owner's attention prior to start of work.
- D. All roof drains are assumed to be in good operating condition. Contractor is to verify good operating condition of roof drains prior to start of work on this project. Damaged, clogged or partially clogged drains must be documented by Contractor and brought to Owner's attention prior to start of work on this project.
- E. Return all roof drains to operating condition at the end of each working day.
- F. Immediately prior to insulation attachment, sweep the deck surface. Do not allow foreign objects to become trapped under the insulation board by being left on the deck surface.
- G. If, during observation of the prepared surface, the Architect or the manufacturer's representative determined the deck surface was not prepared properly, Contractor shall reprepare the surface to the satisfaction of the Architect or manufacturer's representative.
- H. Properly dispose of all debris from roof preparation on a daily basis.
- I. Do not store debris on roof. Contractor shall take care not to over stress roof deck.

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- J. Provide closed trash chutes or other approved means for removal of debris.
- K. Construct all necessary barricades, fencing, warning sign, scaffolding, etc., required to protect personnel and property.
- L. Prior to the completion of the work, remove from the job site all tools, equipment, debris and waste.

## END OF SECTION 07070

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# **SECTION 07200 - BUILDING INSULATION**

## 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 DESCRIPTION OF WORK**

- A. Work included in this Contract: Contractor shall include all labor, materials, services, installation, equipment, etc., necessary to complete all building insulation (except roof insulation) to achieve complete and tight building thermal barrier to prevent the passage of exterior air into conditioned spaces and prohibit the formation of condensation.
  - 1. Provide indicated types of insulation as shown on drawings, as specified herein, and/or as required by all job conditions and building assemblies, whether clearly shown or not to achieve included work.
  - 2. Insulation types include but are not limited to the following:
    - a. Rigid board type cavity wall insulation,
    - b. Fire safing insulation with UL approved coating,
  - 3. Related Work:
    - a. Section 04200 Unit Masonry,
    - b. Section 07840 Through-Penetration Firestop Systems,
    - c. Division 23 Mechanical Work
    - d Division 26 Electrical Work..

## 1.3 QUALITY ASSURANCE

- A. Thermal Conductivity: Thicknesses shown are for thermal conductivity (k-value at 75°F) specified for each material. Provide adjusted thicknesses as directed for equivalent use of material having a different thermal conductivity. Where insulation is identified by "R" value, provide appropriate thicknesses.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
  - 1. Surface-Burning Characteristics: ASTM E 84.
  - 2. Fire-Resistance Ratings: ASTM E 119.
  - 3. Combustion Characteristics: ASTM E 136.
- C. Fire and Insurance Ratings: Comply with fire-resistance, flammability and insurance ratings indicated, and comply with governing regulations as interpreted by authorities.

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## 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature and installation instructions for each type of insulation required. Include data substantiating that materials comply with specified requirements.
- B. Samples: Submit triplicate samples of the following listed items, in accordance with Contract Documents. Obtain Architect's approval before proceeding with ordering or fabrication of items of this section:
  - 1. Each type of insulation specified 12 inches square.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. General Protection and Handling: Protection from Deterioration: Do not allow insulation materials to become wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.

## 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. Extruded-Polystyrene Board Insulation:
    - a. DiversiFoam Products.
    - b. Dow Chemical Company.
    - c. Owens Corning.
    - d. Tenneco Building Products.
    - e. Or approved equal.
  - 2. Fire Safing Insulation:
    - a. Industrial Insulation Group, LLC
    - b. Fibrex Insulations.
    - c. Isolatek International.
    - d. Owens Corning.
    - e. Roxul USA Inc.
    - f. Or approved equal.
- B. Mineral-Wool Board Insulation:
  - 1. Semi-Refractory Fiber Board Fire Safing Insulation: Semi-rigid boards designed for use as a fire stop at openings between edge of slab and exterior wall panels, at top of masonry and wallboard walls/deck interface, and shall be produced by combining semi-refractory mineral fiber manufactured from slag with thermosetting resin binders.
  - 2. Unfaced, Mineral-Wool Board Insulation: ASTM C 612; with a flame-spread index of 15 and a smoke-developed index of zero, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

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- a. Nominal density of 4 lb/cu. ft., Types IA and IB, thermal resistivity of 4°F x h x sq. ft./Btu x in. at 75°F.
- 2. At all rated masonry and wallboard walls and partitions and exterior wall panels, the fire safing insulation shall be coated with 3M Firedam products, or approved equal, to achieve indicated UL design requirements.
- C. Rigid Insulation (cavity wall insulation)
  - 1. Rigid, moisture resistant, closed-cell extruded polystyrene insulation board; ASTM C578, Type IV, 25 psi compressive strength; 1.1 perm-inch maximum vapor transmission; 0.3% maximum water absorption; manufacturer's standard lengths and widths. Provide insulation complying with a flame spread rating of 0 and smoke developed of 155, when tested in accordance with ASTM E84.
    - a. Basis of Design: Provide "Cavitymate Ultra", by Dow Chemical Co., U.S.A.; or approved equal.
      - 1) Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        - a) DiversiFoam Products.
        - b) Owens Corning.
        - c) Tenneco Building Products.
        - d) Or approved equal.
    - b. R-value based on ASTM C518:
      - 1) 10.0 @ 75°F
      - 2) 10.8 @ 40°F
      - 3) 11.2 @ 25°F
    - c. Thickness: 1-3/4", unless indicated otherwise.

# PART 3 - EXECUTION

# 3.1 INSTALLATION, GENERAL

- A. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.
- B. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
  - 1. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.
  - 2. Provide complete and tight building thermal barrier, to prevent the passage of exterior air into conditioned spaces and prohibit the formation of condensation.
  - 3. Provide indicated types of insulation as shown on drawings, as specified herein, and/or as required by all job conditions, building assemblies, <u>and whether clearly shown or not.</u>

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- 4. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
  - a. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
- 5. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
- C. Cavity Wall Insulation
  - 1. On units of plastic insulation, install small pads of mortar or mastic spaced approximately 1'-0" on center both ways on inside face, as recommended by manufacturer. Press courses of insulation between wall ties and other confining obstructions in the cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
    - a. Wedge insulation from outside wythe of construction with small fragments of masonry materials spaced 2'-0" on center both ways.
- D. Fire Safing Insulation
  - 1. Install fire safing insulation at all indicated locations, as required by authorities having jurisdiction and in accordance with manufacturer's instructions.
  - 2. Provide sealant material and type required for indicated applications. Provide fire rated type at rated assemblies.
  - 3. Provide coating materials at indicated UL rated assemblies.
- E. All installations of insulation and work of this section shall meet approval of Architect and all code authorities having jurisdiction at no additional cost to the Owner.

## END OF SECTION 07200

# SECTION 07270 - FLUID APPLIED AIR / VAPOR BARRIERS

## PART 1 - GENERAL

## 1.01 GENERAL REQUIREMENTS

- A. The General Conditions, Supplementary Conditions, Instructions to Bidders, and Division 01- General Requirements shall be read in conjunction with and govern this section.
- B. The Specification shall be read as a whole by all parties concerned. Each Section may contain more or less than the complete Work of any trade. The Contractor is solely responsible to make clear to the installing Subcontractor the extent of their Work.

## 1.02 SUMMARY

- A. This Section includes requirements for supplying labor, materials, tools, and equipment to complete the Work, as shown on the Drawings and as specified herein including, but not limited to, the following:
  - 1. Adhesive/Primer
  - 2. Fluid Applied Impermeable Air and Vapor Barrier
  - 3. Air Barrier/Thru-wall Flashing
  - 4. Sealant
  - 5. Insulation Adhesive

## 1.03 RELATED SECTIONS

- A. Section 04200 Unit Masonry
- B. Section 05500 Metal Fabrications
- C. Section 07200 Building Insulation
- D. Section 07900 Joint Sealer Assemblies
- E. Section 08415 Aluminum Storefront

## 1.04 SUBSTITUTIONS

- A. Submit requests for substitutions in accordance with AIA A201 and Section 00800.
- B. Substitution submission format to include:
  - 1. Evidence that alternate materials meet or exceed performance characteristics of product requirements and documentation from an approved independent testing laboratory certifying that the performance of the system, including auxiliary components exceed the requirements of the local building code.
  - 2. References clearly indicating that the Air / Vapor Barrier Manufacturer has

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successfully completed projects of similar scope and nature on an annual basis for a recommended minimum of ten (10) years.

- 3. Air / Vapor Barrier Manufacturer's guide specification.
- 4. Air / Vapor Barrier Manufacturer's complete set of technical data sheets for assembly.
- 5. Air / Vapor Barrier Manufacturer's complete set of details for assembly.
- 6. Product certification confirming assembly components are supplied and warranted by a single source Air / Vapor Barrier Manufacturer.
- 7. Air / Vapor Barrier Manufacturer statement that anticipated wall assembly compliance with NFPA 285.
- 8. Sample warranty, as specified.
- C. Submit requests for substitutions to this specification within fourteen (14) days following award date. Include a list of a recommended twenty (20) projects executed over the past five (5) years.
- D. Substitute materials not approved in writing shall not be permitted for use on this project.

# 1.05 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
  - 1. AAMA 711-13 Voluntary Specification for Self-Adhering Flashing Used for Installation of Exterior Wall Fenestration Products
  - 2. AAMA 2400-02 Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM D882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting
  - 2. ASTM D903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
  - 3. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
  - 4. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials
  - 5. ASTM E283 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen
  - 6. ASTM E330 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference
  - 7. ASTM E2178 Standard Test Method for Air Permeance of Building Materials
  - 8. ASTM E2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- C. National Fire and Protection Agency (NFPA):
  - 1. NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation

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Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

## 1.06 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meetings:
  - 1. When required, and with prior notice, an Air / Vapor Barrier Manufacturer representative will meet with the necessary parties at the jobsite to review and discuss project conditions as it relates to the integrity of the assembly.

## 1.07 SUBMITTALS

- A. Provide the following requested information in accordance with AIA A201 and Section 00800 Submittal Procedures.
- B. Action Submittals:
  - 1. Product Data:
    - a. Air / Vapor Barrier Manufacturer's guide specification.
    - b. Air / Vapor Barrier Manufacturer's complete set of technical data sheets for assembly.
    - c. Air / Vapor Barrier Manufacturer's complete set of guide details for assembly.
  - 2. Certificates:
    - a. Product certification confirming assembly components are supplied and warranted by a single source Air / Vapor Barrier Manufacturer.
  - 3. Tests and Evaluation Reports:
    - a. NFPA 285 wall assembly compliance:
      - 1) Air / Vapor Barrier Manufacturer statement that anticipated wall assembly complies with NFPA 285.
  - 4. Warranty:
    - a. Sample warranty, as specified.

## 1.08 QUALITY ASSURANCE

- A. Single Source Responsibility:
  - 1. Obtain air barrier and auxiliary materials including adhesive/primer, air barrier, flashings, and sealants from a single Air / Vapor Barrier Manufacturer regularly engaged in the manufacturing and supply of the specified products.
  - 2. Contactor to verify product compliance with Federal, State, and Local regulations controlling use of Volatile Organic Compounds (VOC).
- B. Manufacturer Qualifications:
  - 1. Air / Vapor Barrier Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:
    - a. Air / Vapor Barrier Manufacturer must not issue warranties for terms longer than they have been manufacturing and supplying specified products for similar scope of Work.
- C. Installer Qualifications:
  - 1. Perform Work in accordance with the Air / Vapor Barrier Manufacturer's published

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literature and as specified in this section.

- 2. Maintain one (1) copy of the Air / Vapor Barrier Manufacturer's installation instructions on site.
- 3. At all times during the execution of the Work allow access to site by the Air / Vapor Barrier Manufacturer representative.
- 4. If meeting with the Air / Vapor Barrier Manufacturer during project construction, contact the Air / Vapor Barrier Manufacturer a minimum of two weeks prior to schedule meeting.

## 1.09 MOCK-UPS

- A. Mock-ups: Construct mock-ups to verify selections made under submittals and to set quality standards for materials and execution in accordance with Section 04200 for mock-ups and as follows:
  - 1. Where directed by Architect, construct typical exterior wall section, incorporating substrate materials, and adjacent materials including flashing, typical wall opening (storefront system), attachment of insulation; showing vapor permeable water resistive air barrier application details.
- B. Notify Architect a minimum seven (7) days prior to mock-up construction.
- C. Review and acceptance of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless Architect specifically notes such deviations in writing.
- D. Once reviewed by Architect, acceptable mock-up can form a permanent part of the Work and will form the basis for acceptance for the remainder of the project.
- E. Remove and replace materials found unacceptable at no additional cost to the Owner.

## 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials:
  - 1. Materials shall be delivered to the jobsite in unopened, undamaged and clearly marked containers indicating the name of the Air / Vapor Barrier Manufacturer and product.
- B. Storage of Materials:
  - 1. Store materials as recommended by the Air / Vapor Barrier Manufacturer and conforming to applicable safety regulatory agencies. Refer to all applicable data including, but not limited to, SDS information, Product Data sheets, product labels, and specific instructions for personal protection.
  - 2. Keep solvents away from open flame or excessive heat.
  - 3. Store materials in original packaging.
  - 4. Protect rolls from direct sunlight until ready for use.
  - 5. Refer to Air / Vapor Barrier Manufacturer's published literature.
- C. Handling:
  - 1. Refer to Air / Vapor Barrier Manufacturer's published literature.

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## 1.11 SITE CONDITIONS

- A. Environmental Requirements:
  - 1. No Work shall be performed during rain or inclement weather.
  - 2. No Work shall be performed on frost covered or wet surfaces.

## B. Protection:

- 1. It is the responsibility of the installing Subcontractor to protect all surfaces not included in scope of Work from overspray including, but not limited to, windows, doors, adjacent areas, and vehicles.
- 2. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane. Do not proceed with the application of the field air barrier until the roof has been installed
- C. Ensure all preparation Work is completed prior to installing air barrier.
- D. All equipment shall be grounded during operations.

## 1.12 WARRANTY

- A. Manufacturer's Single Source Warranty:
  - 1. Fluid Applied Air and Vapor Barrier:
    - a. Product Warranty: Manufacturer warrants the material against product defect for a period of **five (5) years** from date of purchase.

## PART 2 - PRODUCTS

## 2.01 MANUFACTURERS

- A. Air / Vapor Barrier and auxiliary materials must be obtained as a single-source from the Air / Vapor Barrier Manufacturer to ensure total system compatibility and integrity.
- B. Basis of Design: Henry® Co.; or approved equal.
  - 1. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to the following:
    - a. Equivalent by GCP Applied Technologies;
    - b. Equivalent by W.R. Meadows;
    - c. Or approved equal.

## 2.02 MATERIALS

- A. Air / Vapor Barrier Primary Fluid-Applied, Air and Vapor Barrier Basis of Design: Henry® Air-Bloc® 16MR, or approved equal:
  - 1. Fluid-applied vapor impermeable air and water barrier consisting of a single component water-based elastomeric formulation that cures to a tough monolithic rubber-like membrane; having the following typical physical properties:
    - a. Color: Gray
    - b. Water Vapor Permeance (ASTM E96 Method A): 0.03 perms

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- c. Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
- d. Air Permeance (ASTM E2178): Pass
- e. Elongation (ASTM D412): 270%
- f. Tensile Strength (ASTM D412): 100 psi (689 kPa)
- g. Surface Burning Characteristics (ASTM E84):
  - 1) Flame Spread: Class A
  - 2) Smoke Development: Class A
- h. Minimum Application Temperature: 20F (-6°C)
- i. Water Penetration Resistance Around Nails (ASTM D1970): Pass
- j. Maximum VOC:100 g/l
- 2. Assembly Auxiliary Materials:
  - a. Adhesives/Primers:
    - 1) Low VOC adhesive:
      - a) Synthetic rubber based quick setting adhesive with low VOC content; having the following typical physical properties:
        - (1) Basis of Design: Henry® Blueskin® LVC Adhesive, or approved equal.
        - (2) Color: Blue
        - (3) Maximum VOC: <240 g/L
        - (4) Drying time (initial set): 30 minutes
        - (5) Low Application Temperature: 10°F (-12°C)
    - 2) Quick setting primers:
      - a) Synthetic rubber based quick setting adhesive with low VOC content; having the following typical physical properties:
        - (1) Basis of Design: Henry® Blueskin® LVC Spray Primer, or approved equal.
        - (2) Color: Blue
        - (3) Maximum VOC: 250 g/L
        - (4) Dry time: 1-3 minutes
        - (5) Low Application Temperature: 40°F (4.4°C)
      - b) Polymer emulsion water based quick setting adhesive with low VOC content; having the following typical physical properties:
        - (1) Basis of Design: Henry® Aquatac<sup>™</sup> Primer, or approved equal.
        - (2) Color: Aqua
        - (3) Maximum VOC: 50 g/L
        - (4) Drying time (initial set): 30 minutes
        - (5) Low Application Temperature: 25F (-4°C)
  - b. Liquid-Applied Flashing:
    - 1) Moisture-curing single component elastomeric liquid-applied flashing using a highly advanced Silyl-Terminated Polyether (STPE) polymer curing to a monolithic membrane; having the following typical physical properties:
      - a) Basis of Design: Henry® Air-Bloc® LF Liquid-Applied Flashing, or approved equal.
      - b) Color: Blue
      - c) Air Permeance (ASTM E2178): Pass
      - d) Water Vapor Permeance (ASTM E96): 21.8 perms @ 25 mils

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- e) Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
- f) Water Resistance (AC212/ASTM D2247): Pass
- g) Nail Sealability (AAMA 711): Pass
- h) Surface Burning Characteristics (ASTM E84):
  - (1) Flame Spread: Class A
  - (2) Smoke Development: Class A
- i) Elongation (D412): 264%
- j) Low Application Temperature:  $20^{\circ}F(-7^{\circ}C)$
- c. Self-Adhered Flashing:

# Note: The following product is to be used in conjunction with the stainless steel fabric flashing as specified in Section 04200. The self-adhered flashing shall overlap the copper fabric flashing.

- 1) Non-vapor permeable, self-adhered water resistive air and vapor barrier consisting of an SBS rubberized asphalt compound integrally laminated to a high strength polyethylene with surface layer of metallic aluminum film; having the following typical physical properties:
  - a) Basis of Design: Henry® Metal Clad® Self-Adhered Water Resistive Air Barrier, or approved equal.
  - b) Color: Metallic Aluminum
  - c) Thickness: 45 mils (1.14 mm)
  - d) Water Vapor Permeance (ASTM E96): 0.014 perms
  - e) Nail Sealability (ASTM D1970): Pass
  - f) Elongation (ASTM D412): 85%
  - g) Low Application Temperature: 20°F (-7°C)
- d. Sealants:
  - 1) Building Envelope Sealant:
    - a) Moisture cure, medium modulus polymer modified sealing compound; having the following typical physical properties:
      - (1) Basis of Design: Henry® 925 BES Sealant, or approved equal.
      - (2) Color: Varies
      - (3) Elongation: 450 550%.
- e. Joint Treatment Mesh:
  - 1) Open weave glass fabric yarn saturated with synthetic resins, having the following typical physical properties:
    - a) Basis of Design: Henry® 183 Repair Fabric Yellow Fiberglass, or approved equal.
- 3. Additional Materials:
  - a. Through-Wall Flashing:
    - 1) Non-vapor permeable self-adhered through-wall flashing consisting of an SBS rubberized asphalt compound integrally laminated to a yellow engineered thermoplastic film surface; having the following typical physical properties:
      - a) Basis of design: Henry® Blueskin® TWF Thru-Wall Flashing, or approved equal.

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- b) Color: Yellow
- c) Thickness: 40 mils (1.0 mm)
- d) Water Vapor Permeance (ASTM E96): 0.03 perms
- e) High Temperature Stability Flow Resistance (ASTM D5147): Pass
- f) Low Application Temperature: 20°F (-7°C)
- b. Insulation Adhesive:
  - 1) Trowel grade solvent-type, synthetic rubber-based insulation contact adhesive; having the following typical physical properties:
    - a) Basis of Design: Henry® Air-Bloc® 21 Air and Vapor Barrier & Insulation Adhesive, or approved equal.
    - b) Color: Cream
    - c) Water Vapor Permeance (ASTM E96): 0.03 perms
    - d) Maximum VOC: < 250 g/L

## PART 3 - EXECUTION

## 3.01 EXAMINATION

- A. Verification of Conditions:
  - 1. Verify substrates to receive Work and surrounding adjacent surfaces are in accordance with Air / Vapor Barrier Manufacturer published literature prior to installation of self-adhered air barrier assembly.
  - 2. Existing substrate must be continuous and secured prior to application of air barrier.
  - 3. Sheathing panels must be securely fastened and installed flush to ensure a continuous substrate in accordance with Air Barrier Manufacturer published literature.
  - 4. Fastener penetrations must be set flush with sheathing and fastened into solid backing.
  - 5. Strike masonry joints full and flush.
  - 6. Concrete surfaces shall be smooth and without large voids, spalled areas or sharp protrusions.
  - 7. New concrete should be cured for a minimum of sixteen (16) hours after forms are removed.
  - 8. Curing compounds or release agents used in concrete construction must be resin based without oil, wax or pigments.
  - 9. Do not install air barrier over saturated substrates.
- B. Notify General Contractor in writing of any conditions that are not acceptable.
- C. The installing Contractor shall examine and determine that surfaces and conditions are ready to accept the Work of this section in accordance with published literature. Commencement of Work or any parts thereof shall mean installer's acceptance of the substrate.
- D. Do not apply air barrier until substrate and environmental conditions are in accordance with Air / Vapor Barrier Manufacturer's published literature.

## 3.02 **PREPARATION**

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- A. All surfaces must be sound, dry, clean, and free of oil, grease, dirt, excess mortar, frost, laitance, loose and flaking particles, or other contaminants.
- B. Protect adjacent surfaces not included in scope of Work to prevent spillage and overspray.
- C. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane.
- D. Hot weather or direct-sun applications over porous substrates, such as concrete, promote rapid surface drying and can form blisters in the fluid applied membrane air barrier during curing. To aid in blister prevention prepare substrate in accordance with one of the following optional procedures:
  - 1. Prime Coat:
    - a. Apply a thin prime coat of air barrier to substrate.
    - b. Allow air barrier to fully cure prior to subsequent application.
    - c. Install air barrier to Air / Vapor Barrier Manufacturer minimum recommended mil thickness.
  - 2. Two Coat:
    - a. Apply air barrier to achieve one-half (1/2) of Air / Vapor Barrier Manufacturer minimum recommended mil thickness.
    - b. Allow air barrier to fully cure prior to subsequent application.
    - c. Apply air barrier to achieve one-half (1/2) of Air / Vapor Barrier Manufacturer minimum recommended mil thickness.
    - d. Overall dry mil thickness shall be in accordance with Air / Vapor Barrier Manufacturer published literature.

## 3.03 INSTALLATION

- A. Ensure substrate is ready to receive air barrier in accordance with Air / Vapor Barrier Manufacturer's published literature.
- B. Temperature limitation:
  - 1. Primary air barrier:
    - a. Substrate temperature must be above 20°F (-6°C) and rising.
  - 2. Auxiliary products:
    - a. Temperature limitations may vary. Refer to Air / Vapor Barrier Manufacturer published literature.
- C. Application of Flashing:
  - 1. Self-adhered Flashing:
    - a. Where required install adhesive/primer recommended by Air / Vapor Barrier Manufacturer continuously at rate recommended ensuring complete substrate coverage of anticipated flashing installation area.
      - 1) Allow adhesive/primer to cure to a tacky film prior to application of flashing.
      - 2) Only apply adhesive/primer to surfaces which will be covered during the same working day. Primed areas not covered by end of day must be re-primed prior to installation of flashing.

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- b. Measure and cut self-adhered flashing to ensure adequate length to achieve continuous coverage of desired installation.
- c. Peel protective film from self-adhered flashing and align top of membrane verifying proper positioning prior to complete film removal and flashing placement.
- d. Press self-adhered flashing firmly into place by applying hand pressure to the middle of the membrane and working the pressure to the edges eliminating wrinkles and air bubbles.
- e. Install self-adhered flashings in shingle fashion to eliminate reverse laps.
- f. Where required, prime laps at rate recommended by air barrier manufacture to ensure complete coverage of anticipated lap installation.
- g. Lap adjoining edges a minimum of two (2) inches.
- h. Roll flashing and laps with countertop roller to obtain thorough adhesion.
- i. Seal end of day exposed reverse laps of self-adhered flashing with building envelope sealant.
- D. Detailing/Flashing:
  - 1. Complete detailing and flashing installations per Air / Vapor Barrier Manufacturer's published literature.
  - 2. Refer to Air / Vapor Barrier Manufacturer guide details for further clarification and installation procedures including, but not limited to, the following:
    - a. Inside corners
    - b. Outside corners
    - c. Pipe penetrations
    - d. Shelf angles
    - e. Wall to foundation transitions
    - f. Rough openings:
      - 1) Install rough opening details per Window Manufacturer's published literature and in accordance with ASTM E2112.
      - 2) Wall assemblies containing a vapor retarder on the interior wall assembly:
        - a) Extend flashing into rough opening to ensure sufficient membrane for connection with vapor retarder and provide a continuous air barrier assembly.
      - 3) Reverse laps:
        - a) Seal permanently exposed reverse laps with sealant:
          - (1) Building envelope sealant
          - (2) Liquid flashing
      - 4) Moving Joints:
        - a) Contact Air / Vapor Barrier Manufacturer.
      - 5) Transitions:
        - a) Contact Air / Vapor Barrier Manufacturer to coordinate transition of self-adhered air barrier to adjacent areas including, but not limited to, the following:
          - (1) Roof to air barrier
          - (2) Air barrier to waterproofing
          - (3) Fastener penetrations
- E. Thru-Wall Flashing: Coordinate with Sections 04200, 07600 and 08415.
- F. Application of Primary Fluid-Applied, Air and Vapor Barrier:

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- 1. Apply air barrier in continuous, monolithic application without sags, runs, or voids, transitioning onto flashing membrane and overlapping one (1) inch, to create uniform drainage plane and air barrier.
- 2. Install air barrier so that subsequent membrane installation laps one (1) inch onto flashing ensuring an air and air barrier assembly.
- 3. Allow air barrier to fully cure prior to placement of insulation.
- 4. Total Dry Film Thickness (DFT):
  - a. Coverage rates may vary due to surface texture or porosity. Refer to Air / Vapor Barrier Manufacturer Technical Data Sheet for recommended coverage rates.
- G. Insulation Adhesive:
  - 1. Coordinate with Section 07200 for insulating materials.
  - 2. Upon curing of the air barrier apply insulation adhesive in a serpentine pattern.
  - 3. Immediately embed insulation into the adhesive and press firmly into place to ensure full contact. Apply additional adhesive if allowed to skin over.
  - 4. Fully butter all joints of insulation panels with adhesive during installation, with the exception of expansion joints.
- H. Fastener Penetrations Through Primary Air Barrier:
  - 1. It is the responsibility of the installer penetrating the air barrier assembly to properly install fasteners and components in accordance with the Air / Vapor Barrier Manufacturer's published literature.
  - 2. Installation requirements:
    - a. Drill fasteners and components with sufficient compression to maintain continuity in the air barrier assembly.
    - b. Refer to "Self-tapping fasteners" and/or "Pre-drilled fasteners".
  - 3. Supplemental sealant:
    - a. Penetrations that do not meet installation requirements require the addition of sealant at point of insertion through the air barrier membrane to maintain continuity in the air barrier assembly.
  - 4. Self-tapping fasteners:
    - a. Fastener head must be larger in diameter than the shank.
    - b. Drill fasteners perpendicular to the substrate until flush with the air barrier.
    - c. Drill fasteners to provide a continuous compression firmly against the air barrier membrane creating a gasketing seal without damaging the membrane.
    - d. Do not install fasteners through air barrier over unsupported areas of the substrate such as sheathing joints.
    - e. Overdriven fasteners, improperly installed fasteners, defective/broken fasteners, or fasteners not properly fastened into the building structure beyond the air barrier membrane should be removed and the vacated hole sealed with sealant prior to the installation of the cladding or veneer system.
  - 5. Pre-drilled fastening assemblies:
    - a. Fastening head or assembly component must be larger in diameter than pre-drilled hole.
    - b. Fastening head or assembly component must be mounted flush with the air barrier.
    - c. Fastening head or assembly component must provide a continuous compression firmly against the air barrier creating a gasketing seal without damaging the integrity of the air barrier.

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- d. Do not install fastening components through air barrier over unsupported areas of the substrate such as sheathing joints.
- e. Seal improperly drilled and/or vacated holes with sealant prior to the installation of the cladding or veneer system.

## 3.04 FIELD QUALITY CONTROL

- A. Damage to surface by other trades shall not be the responsibility of the installing Subcontractor.
- B. Final Observation and Verification:
  - 1. Final inspection of air barrier assembly shall be carried out by the Owner's representative, the Contractor, or Air / Vapor Barrier Manufacturer as required by warranty.
  - 2. Contact Air / Vapor Barrier Manufacturer for warranty issuance requirements.
- C. Air barrier assembly is not designed for permanent UV exposure. Refer to Air / Vapor Barrier Manufacturer published literature for product limitations.

#### 3.05 CLEANING

- A. Promptly as the Work proceeds, and upon completion, clean up and remove from the premises all rubbish and surplus materials resulting from the foregoing Work.
- B. Clean soiled surfaces, spatters, and damage caused by Work of this Section.
- C. Check area to ensure cleanliness and remove debris, equipment, and excess material from the site.

#### END OF SECTION 07270

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# SECTION 07500 - ROOFING, GENERAL

## PART 1 - GENERAL

## 1.1 DESCRIPTION OF WORK

- A. The requirements of this section apply to the work specified in the following sections:
  - 1. Section 06100 Carpentry,
  - 2. Section 07070 Selective Roof Demolition,
  - 3. Section 07535 Repairs to Modified Bitumen Roofing System,
  - 4. Section 07600 Flashing, Sheet Metal and Roof Accessories,
  - 5. Section 07800 Roof Specialties and Accessories.
- B. This section includes alterations and tie-ins to existing warrantied roofing system and as shown on Drawings.

## 1.2 QUALITY ASSURANCE

- A. Roofing repair work, including work of all sections listed in 1.1 above, must be included in a single Subcontract, so that there will be undivided responsibility for the specified performance of all component parts.
- B. Installer Prequalification: Installer must be a recognized Roofing Contractor, skilled and experienced in the types of work required, and equipped to perform workmanship in accordance with recognized standards.
  - 1. Minimum Experience: Not less than a recommended five (5) years experience in applications for indicated roofing systems, and in roofing projects of magnitude equivalent to the required work.
  - 2. Maintenance Proximity: Recommended location of not more than two hours normal travel time from Installer's maintenance plant to project site.
    - a. Optional Proximity: At Contractor's option, and with Owner's prior acceptance of Installer's certification that work of the Maintenance Agreement will be performed by a designated roofing contractor whose plant is located not more than two hours normal travel time from project site, the above requirements will be waived.
- C. Product Bid: The product bid must have past performance of installation on a roof in the state where project is located for a recommended minimum of five (5) years, under the same name of manufacturer as bid.
- D. Alterations to existing roof: Contractor shall make necessary tie ins and alterations to existing roof in accordance with details indicated and "Basis of Design" product requirements so as to maintain original warranty on existing roof and/or achieve complete weather tight conditions.

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## 1.3 SUBMITTALS

- A. Submit certification that the roof materials furnished for roof alterations and tie-ins is Tested and Approved by Factory Mutual as a Class 1-SH roof system with 1-90 Wind Uplift Requirements, or Listed by Underwriters Laboratories or Warnock Hersey for external fire tests of ASTM E - 108 Class A.
- B. Product Data for each type of product specified include manufacturer's technical product data, installation instructions, and recommendations for each type of roofing product required. Include data substantiating that materials comply with specified requirements.
- C. For all modified bituminous sheet roofing include independent test data according to ASTM designation D-5147-91 "Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material" substantiating that materials comply with specified requirements. A separate Certificate of Analysis for each production run of material shall indicate the following information:
  - 1. Material type.
  - 2. Lot number.
  - 3. Production dates.
  - 4. Dimension and Mass.
  - 5. Physical and Mechanical Properties.
- D. Shop Drawings: Submit roofing membrane layout drawings showing the outline of existing roof and locations of flashings and tie-ins, seam locations, specific roofing repair details illustrating relationships with adjacent construction, and flashing details at indicated tie-in conditions.
  - 1. Submit shop drawings of manufactured and/or fabricated sheetmetal work.
  - 2. Contract Drawing Detail Approval: If the roofing manufacturer takes exception to the Bid Document details, the manufacturer shall provide the Roofing Contractor with acceptable details to be submitted to the Architect for approval. This Project must receive Architect's approval through this process prior to shipment of materials to the project site. All roofing work required by the roofing system manufacturer shall be included in the contract at no additional cost to the Owner.
- E. Samples: Samples of each material specified, properly labeled.
  - 1. Roof membrane: For project records, submit 8- by 10-inch samples of membrane cut from rolls of each type of material used on the project.
  - 2. Flashing membrane: Submit 12-inch-square samples of sheet material to be used for base flashings.
  - 3. Fasteners: Submit (2) of each type.
  - 4. Adhesives: Submit samples for each type to be used.

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## 1.4 JOB CONDITIONS

- A. Roofing Conference: Prior to the installation of the roofing repair and associated work, meet at the project site with the Installer, the Installers of each component of associated work, and the Architect and other representatives directly concerned with performance of the work, including, where applicable, product manufacturers and the Owner. Record (by Contractor) the discussions of the conference and the decisions and agreements, or disagreements reached, and furnish a copy of the record to each party attending. Review foreseeable methods and procedures related to the roofing work including, but not necessarily limited to, the following:
  - 1. Review Project requirements (Drawings, Specifications and other Bid Documents).
  - 2. Review status of existing conditions and substrate (by the Roofing Installer), including extent of moisture penetration in existing work, drying and similar considerations.
  - 3. Review availability of materials, tradesmen, equipment and facilities needed to make progress and avoid delays.
  - 4. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
  - 5. Review regulations concerning Code compliance, environmental protection, health, safety, fire and similar considerations.
  - 6. Establish units of work, including preparation, such that each unit may be completed prior to end of each day's work.
- B. Weather Condition Limitations:
  - 1. During periods of inclement weather, Contractor shall use wet power vacuums, on the day following each rain, to remove standing water so as not to delay his operations.
  - 2. Proceed with roofing and associated work only when weather conditions will permit unrestricted use of materials and quality control of the work being installed, complying with the requirements and the recommendations of the roofing materials manufacturers.
  - 3. Proceed only when the Contractor is willing to guarantee the work as required and without additional reservations and restrictions.
  - 4. Protect existing work and property from damage during the course of the work. Be prepared for all weather and other contingencies as prudence may dictate. Maintain on the site at all times sufficient and proper materials for temporary roofing and other protection when weather conditions prevent continuance of work and do not permit completion of each unit of work prior to the end of each working day. Temporary protection and roofing work must be provided at no additional cost to the Owner.
  - 5. Remove and discard materials which have been used for temporary roofs, protection, water seals, and related work. Do not incorporate used materials into the work.

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C. Storage of Materials and Property: Do not overstress roof decks and supporting structures. Avoid placing loads at midspans of framing. All superimposed loads shall be well distributed. Do not store more material on roofs than can be installed in one and one-half working days. Store materials, except membrane, in dry area and protect from water and direct sunlight. Damaged materials shall be replaced at Contractor's expense. Protect adjacent work from damage due to roofing operations and related work. Provide temporary protection against walls adjacent to roofing work; remove protection upon completion.

# PART 2 - PRODUCTS

## 2.1 GENERAL ROOFING MATERIALS

A. Refer to other sections for new roofing work and all requirements of roofing materials, products and systems.

## **B.** Alterations and Tie-ins to Existing Roofs

- 1. Provide Roofing materials, flashings, primers, adhesives and all other required accessories to meet or exceed the following "Basis of Design" minimum performance requirements. All roofing materials shall be UL Class A, FM Class 1-SH listed and shall comply with the International Building Code, and CGSB 37-GP-56M standards.
- 2. Wood Cants and Curbs: Lumber; #2 grade free from warping and visible decay; fire retardant treated, and marked.
- 3. Mechanical Fasteners: Manufacturer's standard FM approved fasteners for this type of application.
- 4. Other Materials and Accessories: Manufacturer's standard and/or approved products for indicated applications.

# PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Contractor shall prepare a plan and submit it to the Architect for which identifies how the roofing repairs and all associated work will be performed so as to prevent foot traffic on the newly installed roofing system.
- B. Coordinate the installation of roofing repair materials and associated work so as to provide a complete system complying with the combined recommendations of manufacturers and installers involved in the work.
- C. Protect other work from spillage of roofing materials, and prevent materials from entering and clogging drains and conductors. Replace or restore other work which is soiled or otherwise damaged by the performance of the roofing and associated work.

# 3.2 **PERFORMANCE REQUIREMENTS**

A. Initial Weather Resistance: It is required that the roofing and associated work be durable in normal weather exposure and not leak water during rainstorms. After completion of the

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roofing and associated work, and either during or immediately after a rainstorm, (and just before final acceptance of the work) the Installer shall meet with the Contractor at the project and inspect the building for evidence of leaks in the roofing and associated work. Prepare a written report without delay (by Contractor) covering the inspection, and submit to Owner (with copy to Architect). Should no rain occur between the time the roof is completed and when all punch list items have been corrected, this requirement shall be waived.

- B. Repair or replace roofing and associated work, as required, to eliminate leaks or other inability of roofing to initially withstand normal weather exposure.
  - 1. Abnormal weather exposure is recognized to include hailstorms, lightning strikes, hurricane and tornadic winds, and other unusual phenomena of the weather as frequently covered by building insurance.

## C. Alterations and Tie-ins to Existing Roofs

- 1. Examine substrate surfaces to receive roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- 2. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane.
- 3. Cooperate with inspection and test agencies engaged or required to perform services in connection with roofing system installation.
- 4. Insurance/Code Compliance: Install roofing and flashing work (and test where required to show) compliance with governing regulations.
- 5. Coordinate the installation of roofing sheets, flashings, stripping, coatings and surfacing, so that felts are not exposed to precipitation nor exposed overnights. Provide cut-offs at the end of each day's work, to cover exposed felts and insulation with a course of coated felt with joints and edges sealed with roofing cement. Remove cut-offs immediately before resuming work. Glaze coats installed ply-sheet courses at the end of each day's work where final surfacing has not been installed.
- 6. Substrate Joint Penetrations: Do not allow adhesive to penetrate substrate joints and enter building or damage existing or new insulation, vapor barriers (retarders) or other construction.
- 7. General Requirements: Apply roofing membrane in accordance with roofing material manufacturer's instructions. Application of roofing shall immediately follow application of base sheet and/or insulation as a continuous operation.
- D. Agreement to Maintain Roofing: See Part 1, Section 01900 Guarantees and Warranties.

## END OF SECTION 07500

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#### 2:07500-5

# SECTION 07535 – REPAIRS TO GARLAND MODIFIED BITUMINOUS MEMBRANE ROOFING - COLD APPLIED

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. The specification sections "General Conditions," "Special Requirements" and "General Requirements" form a part of this section by this reference hereto and shall have the same force and effect as if printed herewith in full.

## **1.2 SECTION INCLUDES**

- A. Cold Applied 2-Ply Asphalt Roofing (StressPly)
- B. Roof Penetration Flashings
- C. Roof Insulation and Recovery Boards
- D. Roof Walkway and Protection Pads
- E. Roof Membrane Manufacturers Inspection

## **1.3 RELATED SECTIONS**

- A. Section 06100 Carpentry.
- B. Section 07070 Selective Roof Demolition.
- C. Section 07600 Flashing, Sheet Metal and Roofing Accessories.
- D. Section 07800 Roof Specialties and Accessories.
- E. Section 07900 Joint Sealer Assemblies.
- F. Division 23 Mechanical Work.
- G. Division 26 Electrical Work.

## **1.4 SCOPE OF WORK**

A. Furnish and install repairs to the existing Garland 2-Ply Modified Bitumen Roof Membrane System, SBS Adhesive, flashing, insulation and other roofing boards, and all miscellaneous work.

## 1.5 REFERENCES

- A. ASTM D 41 Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
- B. ASTM D 312 Standard Specification for Asphalt used in Roofing.
- C. ASTM D 451 Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.

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- D. ASTM D 1970 Specification for Sheet Materials, Self-Adhering Polymer Modified Bituminous, Used as Steep Roofing Underlayment for Ice Dam Protection.
- E. ASTM D 1079 Standard Terminology Relating to Roofing, Waterproofing and Bituminous Materials.
- F. ASTM D 1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.
- G. ASTM D 1863 Standard Specification for Mineral Aggregate Used as a Protective Coating for Roofing.
- H. ASTM D 2178 Standard Specification for Asphalt Glass Felt Used as a Protective Coating for Roofing.
- I. ASTM D 2822 Standard Specification for Asphalt Roof Cement.
- J. ASTM D 2824 Standard Specification for Aluminum-Pigmented Asphalt Roof Coating.
- K. ASTM D 4601 Standard Specification for Asphalt Coated Glass Fiber Base Sheet Used in Roofing.
- L. ASTM D 5147 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.
- M. ASTM D 6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
- N. ASTM D 6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
- O. ASTM D 6164 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
- P. ASTM D 6757 Standard Specification for Underlayment Felt Containing Inorganic Fibers Used in Steep-Slope Roofing.
- Q. ASTM E 108 Standard Test Methods for Fire Test of Roof Coverings
- R. Factory Mutual Research (FM): Roof Assembly Classifications.
- S. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.
- T. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Architectural Sheet Metal Manual.
- U. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.
- V. Warnock Hersey (WH): Fire Hazard Classifications.
- W. ANSI-SPRI ES-1 Wind Design Standard for Edge Systems used with Low Slope Roofing Systems.

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- X. ASCE 7-16, Minimum Design Loads for Buildings and Other Structures
- Y. UL Fire Resistance Directory.
- Z. FM Approvals Roof Coverings and/or RoofNav assembly database.

## **1.6 DESIGN / PERFORMANCE REQUIREMENTS**

- A. Perform work in accordance with all federal, state and local codes.
- B. Exterior Fire Test Exposure: Roof system shall achieve a UL, FM or WH Class rating for roof slopes indicated on the Drawings as follows:
  - 1. Underwriters Laboratory Class A Rating.
  - 2. Warnock Hersey Class A Rating.
- C. Roof System membranes containing recycled materials shall be third party certified through UL Environment.
- D. Roof system shall have been tested in compliance with the following codes and test requirements:
  - 1. ITS Directory of Listed Products
  - 2. FM Approvals:
    - a. RoofNav Website

## 1.7 SUBMITTALS

- A. Submit under provisions of AIA A201 and Section 00800.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation instructions.
  - 4. Safety Data Sheets.
  - 5. Roof Membrane Certificate of Analysis
- C. Shop Drawings: Submit shop drawings including installation details of insulation including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.
- D. Recycled Materials: Provide third party certification through UL Environment of roof System membranes containing recycled materials
- E. Verification Samples: For each modified bituminous membrane ply product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- F. Manufacturer's Certificates: Provide to certify products meet or exceed specified requirements.
- G. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer.

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- H. Certifications: The Contractor / Installer / Manufacturer (grantor) shall submit certifications to the Architect that the contract documents including the materials, methods and details of work provided for therein, are adequate to accomplish the specified results.
  - 1. Contractor shall provide manufacturer's "Roof Assembly Letter" confirming each proposed roof system and decking description as follows:
    - a. Assembly,
    - b. Construction Type,
    - c. Maximum Slope,
    - d. Deck Type,
    - e. Insulation Layer (1),
    - f. Insulation Fastening,
    - g. Insulation Attachment Requirements; Field, Perimeter, Corners,
    - h. Insulation Layer (2),
    - i. Insulation Attachment; Adhesive,
    - j. Membrane.
  - 2. The roofing membrane manufacturer shall submit a letter to the Architect, on the company letterhead, certifying that the roofing manufacturer's representative has inspected all cleats, chairs and anchors plates and they have been installed in accordance with the manufacturer's printed installation recommendations.
- I. **Certificate of Analysis**: The Manufacturer shall submit, during the shop drawing process, a certificate of analysis which identifies pertinent information of the actual product which is being manufactured for this project. Refer to the following example (following this specification section) of the information which must be furnished.
  - 1. The Architect shall at their discretion, take samples of the product delivered to the project site and send the samples to an Independent Testing Laboratory to verify the information provided by the manufacturer.
    - a. If the test results of the product delivered to the site differ from those indicated in the 'Certificate of Analysis' furnished by the Manufacturer, the Architect shall reject the deficient product. The Manufacturer shall, at their own cost, remove all deficient product from the site including labor and material for the product already installed, provide replacement material(s) of all deficient material(s) including freight costs and Liquidated Damages if the Milestone Dates identified in Section 01800 are not met.
- J. Submit certification that the roof system furnished is Tested and Approved by Factory Mutual as a Class 1A roof system with 1-90 Wind Uplift Requirements, or Listed by Underwriters Laboratories or Warnock Hersey for external fire tests of ASTM E - 108 Class A and the following:
  - 1. Evidence of Factory Mutual Approval Standard 4470 for the proposed membrane system.
  - 2. Underwriters' Laboratories Class A acceptance of the proposed roofing system

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shall include cold adhesive without additional requirements for gravel or coatings. No other testing agency approvals will be accepted.

- 3. The roof configuration (including fastening of base sheet or insulation) shall be approved by FM for minimum 1-90 windstorm construction.
- 4. The roof membrane configuration shall be approved by FM for Class 1-SH (severe hail) exposure.
- K. Submit product data for each type of product which is part of the roofing assembly, including sheet roofing plies, flashings, roofing boards, sheet metal work, with manufacturer's technical product data, test data and Physical Properties and Performance. Include typical details, installation instructions, and recommendations for each type of roofing product required. Include data substantiating that materials comply with specified requirements.
- L. Shop Drawings: Submit roofing membrane layout drawings showing outline of specific roofing details illustrating relationships with adjacent construction and flashing details at roof penetrations.
  - 1. Submit shop drawings of pre-manufactured and/or fabricated sheet metal work.
  - 2. Contract Drawing Detail Approval: If the roofing manufacturer takes exception to the Bid Document details, the manufacturer shall provide the roofing Subcontractor with acceptable details to be submitted to the Architect for approval.
    - a. This Project must receive the Architect's approval through this process prior to shipment of materials to the project site.
    - b. All roofing repair work required by the roofing system manufacturer shall be included in the Contract at no additional cost to the Owner.
- M. Samples: Samples of each material specified, properly labeled.
  - 1. Roof membrane: For project record, submit 8- by 10-inch samples of membrane cut from rolls of each type of material used on project.
  - 2. Flashing membrane: Submit 12-inch-square samples of sheet material to be used for base flashings.
  - 3. Fasteners: Submit (2) of each type.
  - 4. Coatings and adhesives: Submit samples for each type to be used.
- N. Submit a letter from the primary roofing manufacturer confirming that proposed membrane manufacturer has been producing SBS products in the United States for a recommended five (5) years without a change in the basic product design, physical and mechanical properties, or SBS modified bitumen blend, polymer specification, asphalt and filler formulation.
  - 1. Letter shall confirm the number of years it has directly manufactured the proposed primary roofing system under the trade name and/or trademarks as proposed.

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- 2. Letter shall confirm that a phased roof application, with only the modified bitumen base ply in place for a period of up to 10 weeks, is acceptable and approved for this project.
- 3. Letter shall include a recommended list of five (5) of the proposed primary roofing manufacturer's projects, located in the United States, of equal size and degree of difficulty which have been performing successfully for a period of at least 5 years.
- 4. Letter shall confirm that the filler content in the elastomeric blend of the proposed roof membrane and flashing components does not exceed 35% in weight.
- 5. Letter shall include a complete list of material physical and mechanical properties for each sheet including: weights and thicknesses; low temperature flexibility; maximum load; elongation @ 5% maximum load (ultimate elongation); dimensional stability; high temperature stability; granule embedment and resistance to thermal shock (foil faced products).
- 6. Letter shall confirm that the proposed roof membrane and flashing components meet or exceed the physical and mechanical requirements listed in Part 2 of this specification.
- 7. Letter shall confirm that the proposed roof membrane system meets the requirements of ASTM D 5849 Resistance to Cyclic Joint Displacement (fatigue) at 14°F (-10°C). Passing results shall show no signs of membrane cracking or interply delamination after 500 cycles in an unaged specimen and 200 cycles in a specimen after heat conditioning.

## 1.8 QUALITY ASSURANCE

- A. Perform repair Work in accordance with NRCA Roofing and Waterproofing Manual.
- B. Manufacturer Qualifications: Manufacturer: Company specializing in manufacturing products specified in this section with documented ISO 9001 certification and recommended minimum twelve (12) years and experience.
- C. Installer Qualifications: Company specializing in performing Work of this section with a recommended minimum five (5) years documented experience and a certified Pre-Approved Contractor.
- D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing repair work while roofing work is in progress.
- E. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.
- F. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

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## **1.9 PRE-INSTALLATION MEETINGS**

- A. Convene minimum two weeks prior to commencing repair Work of this section.
- B. Review installation procedures and coordination required with related Work.
- C. Inspect and make notes of job conditions prior to installation:
  - 1. Record minutes of the conference and provide copies to all parties present.
  - 2. Identify all outstanding issues in writing designating the responsible party for followup action and the timetable for completion.
  - 3. Installation of roofing system shall not begin until all outstanding issues are resolved to the satisfaction of the Architect.

## 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.
- B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.
- C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface. No wet or damaged materials will be used in the application.
- D. Store at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50 degrees F (10 degrees C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.
- E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.
- F. Adhesive storage shall be between the range of above 40 degrees F (4 degrees C) and below 80 degrees F (27 degrees C). Area of storage shall be constructed for flammable storage.
- G. In accordance with the manufacturer's recommendations, immediately remove the plastic wrapping on the roof recovery boards and cover with a watertight, ventilated enclosure (i.e. tarpaulins). Prevent the formation of condensation on the boards.

# 1.11 COORDINATION

A. Coordinate Work with installing associated metal flashings as work of this section proceeds.

# 1.12 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

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## 1.13 WARRANTY

- A. Agreement to Maintain Roofing:
  - 1. Provide Roofing subcontractor's agreement to maintain the roof systems and related roof sheet metal work in a weathertight and watertight condition for a period of **two (2) years** starting from the date of approved substantial completion date and in accordance with special Maintenance Contract outlined herein.
    - a. During the Maintenance Period, the Roofing subcontractor agrees that within 24 hours of receipt of notice from the Owner he will inspect and make immediate emergency repairs to defects or to leaks in the roof systems and related flashing work. He further agrees that within a reasonable time, he will restore the affected items to the standard of the original specifications and without voiding the Manufacturer guarantee. All emergency and permanent work during the life of the agreements to maintain the roof systems will be done without cost to the Owner, except in the event it is determined that such leaks were caused by abuse, lightning, hurricanes, tornado, hailstorm, other unusual climatic phenomena of the elements, or failure of related work (except related roof sheet metal work included under the Agreement) installed by other parties.
    - b. Agreement to maintain roofing system shall be in a written form acceptable to the Architect/Owner and before final payment is released for the project.
    - c. If, 48 hours after notification of roof leakage, Contractor has not responded, Owner shall have the right, without invalidating his warranties and at the expense of the Contractor, to make any emergency temporary repairs that are required in order to protect the building and its contents from damage due to roof leakage.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Provide only roofing, insulation, adhesive and other materials as manufactured by or approved for use by the Roof Membrane Manufacturer for inclusion in the repair work. Only roof membranes, adhesives, flashing and related materials, manufactured by the same Roof Membrane Manufacturer, are permitted for use.
- B. Existing Design: 2-Ply (minimum) Styrene Butadiene Styrene (SBS), Fiberglass Reinforced Modified Bitumen Membrane consisting of a heavy duty reinforced smooth surface base ply and reinforced ceramic granule cap ply installed in the Manufacturers' Low VOC Cold Adhesive meeting or exceeding all minimum technical requirements specified herein and as manufactured by one of the following Manufacturers:
- C. Manufacturer: The Garland Company.

## 2.2 COLD APPLIED 2-PLY ROOF SYSTEM

- A. Base (Ply) Sheet:
  - 1. FlexBase 80: 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing

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base sheet reinforced with a dual fiberglass reinforced scrim, performance requirements according to ASTM D 5147.

- a. Tensile Strength, ASTM D 5147
  - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 225 lbf/in XD 225 lbf/in
  - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 39.0 kN/m XD 39 kN/m
- b. Tear Strength, ASTM D 5147
  - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 300 lbf XD 300 lbf
  - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 1335 N XD 1335 N
- c. Elongation at Maximum Tensile, ASTM D 5147
  - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 7% XD 7%
  - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 7% XD 7%
- d. Low Temperature Flexibility, ASTM D 5147:
  - 1) Passes -30 deg. F (-34.4 deg. C)
- B. Modified Cap (Ply) Sheet:
  - 1. StressPly Plus FR Mineral: 155 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced, rubber modified roofing membrane reinforced with a fiberglass and polyester composite scrim. ASTM D 6162, Type III Grade G
    - a. Tensile Strength, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
      - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m
    - b. Tear Strength, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
      - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 2224 N XD 2224 N
    - c. Elongation at Maximum Tensile, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 8% XD 8%
      - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 8% XD 8%
    - d. Low Temperature Flexibility, ASTM D 5147, Passes -30 deg. F (-34 deg. C)
- C. Interply Adhesive:
  - 1. Weatherking Plus WC; or approved equal: Rubberized, polymer modified cold process asphalt roofing bitumen V.O.C. compliant ASTM D 3019. Performance Requirements:
    - a. Non-Volatile Content ASTM D 4479 78%
    - b. Density ASTM D1475 9 lbs./gal.
    - c. Viscosity Stormer ASTM D562 900-1100 grams
    - d. Flash Point ASTM D 93 100 deg. F min. (37 deg. C)
    - e. Slope: up to 2:12
- D. Flashing Base Ply:
  - 2. FlexBase 80: 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a dual fiberglass reinforced scrim, performance requirements according to ASTM D 5147.
    - a. Tensile Strength, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 225 lbf/in XD 225 lbf/in
      - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 39.0 kN/m XD 39 kN/m
    - b. Tear Strength, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 300 lbf XD 300 lbf
      - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 1335 N XD 1335 N

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- c. Elongation at Maximum Tensile, ASTM D 5147
  - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 7% XD 7%
  - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 7% XD 7%
- d. Low Temperature Flexibility, ASTM D 5147:
  - 1) Passes -30 deg. F (-34.4 deg. C)
- E. Flashing Ply Adhesive:

1.

- Weatherking Flashing Adhesive; or approved equal: Brush grade flashing adhesive.
  - a. Non-Volatile Content ASTM D 4479 70 min.
  - b. Density ASTM D 1475 8.6 lbs./gal. (1kg/l)
  - c. Flash Point ASTM D 93 100 deg. F (37 deg. C)
- 2. Flashing Bond Adhesive
  - a. Non-Volatile Content ASTM D 4586 70%
  - b. Density ASTM D 1475 8.3 lbs./gal.
  - c. Flash Point ASTM D 93 104 deg. F (39.4 deg. C)
- F. Flashing Cap (Ply) Sheet:
  - 3. StressPly Plus FR Mineral: 155 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced, rubber modified roofing membrane reinforced with a fiberglass and polyester composite scrim. ASTM D 6162, Type III Grade G
    - a. Tensile Strength, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
      - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m
    - b. Tear Strength, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
      - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 2224 N XD 2224 N
    - c. Elongation at Maximum Tensile, ASTM D 5147
      - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 8% XD 8%
      - 2) 50 mm/min. @ 23 +/- 2 deg. C MD 8% XD 8%
    - d. Low Temperature Flexibility, ASTM D 5147, Passes -30 deg. F (-34 deg. C)

## 2.3 **ROOF PENETRATION FLASHINGS**

- A. Plumbing/Vent Stack Flashings should be 4lb. (1.8 kg) sheet lead, or 20 oz. copper, formed and rolled.
- B. Liquid Flashing Tuff-Flash Plus LO: A two-part, asphaltic-polyurethane, low odor, liquid flashing material designed for specialized details unable to be waterproofed with typical modified membrane flashings.
  - 1. Solids by Volume 86%
  - 2. Tensile Strength, ASTM D 412: 650 psi
  - **3**. Elongation, ASTM D 412: 325%
  - 4. Density @77 degrees F 8.3 lb/gal typical
- C. Fabricated Flashings: Fabricated flashings and trim are specified in Section 07600.
  - 1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the CDA Copper Development Association "Copper in Architecture - Handbook" as applicable.

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2. Manufactured Roof Specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the NRCA "Roofing and Waterproofing Manual" as applicable.

## 2.4 INSULATION BOARD

- A. Basis of Design: "SecurShield" Polyisocyanurate Board for Uniform and/or Tapered Insulation (and Tapered Saddles), as manufactured by Versico; or approved equal.
  - 1. A foam core insulation board covered on both sides with a moisture resistant coated glass fiber mat facer.
  - 2. Board Size: 4' x 4' only.
  - 3. Thickness (Uniform): As necessary to achieve the required "R" value. See also minimum thickness and required slopes indicated on drawings.
    - a. See roof assemblies for insulation thicknesses and attachment methods. Bottom layer shall be a minimum of 1½" thick, or 3" thick, as per the project roof assembly, with staggered joints plus ½" minimum of tapered insulation at the low point, as indicated.
      - 1) Tapered insulation; 1/4" to the foot slope for the roof area; and ½" or 3.5" to the foot slope for gussets/crickets (Refer to Roof Plans). Stagger all joints between layers.
  - R-Value (Uniform): Minimum of R=Per the project Roof Assembly, per a minimum of two layers as per the Roof Assembly [LTTR: 5.6. per 1"; R-11.4 per 2"; R-17.4 per 3"; R-23.6 per 4"], unless indicated otherwise in the roof assembly illustrations.
  - 5. Density: 1.5 pcf.
  - 6. Surface Burning Characteristics: Tested in accordance with ASTM E 84 and IBC 719.2:
    - a. Flame Spread: Not more than 25
    - b. Smoke developed: Not more than 200
  - 7. Insulation boards must pass the tests of:
    - a. ASTM C1289-06, Type II, Class 2, Grade 3 (25 psi).
    - b. FM Class 1 approval for steel roof deck construction: FM 4450 or UL1256.
    - c. FM 4470 (subject to the conditions of approval described in <u>www.Roofnav.com</u>.
    - \* No substitution will be allowed.
- B. Top Over Laying Board:
  - 1. THERMAL BARRIER BOARD
    - a. Basis of Design: "Securerock Gypsum-Fiber" Roof Board as manufactured by USG; or approved equal.
      - 1) Water-resistant and silicone-treated gypsum core board, UL 790 Class A listing as a barrier board, and tested in accordance with ASTM

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E-84:

- a) Flame Spread: 0
  - b) Smoke developed: 0
- 2) Board Size: 4' x 4'.
- 3) Thickness (Uniform): 1/2", R-/value per ASTM C518 = 0.5
- 4) FM approved for Wind Uplift, tested for 90 psf.
- 5) Stagger all joints with bottom layer.
- C. Adhesive for Top Over Laying Boards: "Insul-Lock HR" as provided and recommended by roofing membrane manufacturer, or approved equal.
  - 1. Insulation Adhesive: Dual-component, high rise foam adhesive as recommended by insulation manufacturer and approved by FM indicated ratings.
    - a. Tensile Strength (ASTM D412).....250 psi
    - b. Density (ASTM D1875)......8.5 lbs./gal.
    - c. Viscosity (ASTM D2556)......22,000 to 60,000 cP.
    - d. 2 'Peel Strength (ASTM D903).....17 lb/in.
    - e. 3 `Flexibility (ASTM D816).....Pass @ -70°F
- D. Sealant: A moisture-curing, non-slump elastomeric sealant designed for roofing applications. The sealant shall be approved by the roof membrane manufacturer for use in conjunction with the roof membrane materials.
  - 1. As recommended by roofing membrane manufacturer.

## 2.5 MISCELLANEOUS ROOFING MATERIALS

- A. Ceramic Granules: No. 11 grade specification ceramic granules of color scheme matching the granule surfacing of the finish ply.
- B. Cant Strips and Tapered Insulation Edge: provide only manufacturer roof insulation accessory materials composed of wood fiber combined with waterproofing binders. The top surface shall be pre-treated with an asphalt-based coating. The face of the cant shall have a nominal four (4) inch dimension. Provide tapered insulation edge boards to provide smooth transition, without vertical rise, in dimensions required to achieve positive slope.
- C. Walkway & Protection Pads: TRAFGARD; or approved equal, Recycled rubber (97% recycled rubber), anti-skid surface pads, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer.
  - 1. Pad Size:  $3'-0'' \times 4'-0'' \times \frac{1}{2}''$  thick for walkway pads
- E. Protection and Walkway Pads Adhesive: Greenlock Structural Sealant; or approved equal.
- F. Mechanical Fasteners: Manufacturer's standard approved fasteners for this type of application.
  - 1. Fasteners: Corrosion resistant screw fastener as recommended by roof membrane manufacturer.

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- a. Factory Mutual Tested and Approved with three (3) inches coated disc for I-90 rating, length required to penetrate metal deck one inch.
- b. Color shall be Gray.
- 2. GAF "Drill-Tec #14 Fastener, length as required, #3 Phillips Head, Color Grey; or approved equal.
- G. Base Sheet: An approved ASTM D4601, Type II: Ultra-Shield Glasbase; GAF-GLAS #75 or Perma-ply 28 glass fiber base sheet; or approved equal.
- H. Base Sheet Fasteners:
  - 1. OMG Roofing Products' OlyLok 1.4 or 1.8 base sheet fastener **as required per field pullout tests.** At a minimum, all fasteners shall be installed per this specification and manufacturer's recommendations, whichever is more stringent, to resist uplift pressures as calculated in accordance with FM-I-90 wind uplift resistance and **confirmed field tested pullout values.**
- I. Metal Discs: Flat discs or caps of zinc-coated sheet metal not lighter than 28 gauge and not less than 1-inch in diameter. Discs shall be formed to prevent dishing. Bell or cup-shaped caps <u>are not acceptable</u>.
- J. Related Materials and Accessories
  - 1. Metal Primer: Zinc chromate type.
  - 2. Plastic Cement: ASTM D 4586
  - 3. Sealant: Refer to Section 07900 or on drawings.
  - 4. Fasteners:
    - a. Corrosion resistant screw fastener as recommended by metal manufacturer. Finish exposed fasteners same as flashing metal.
    - b. Fastening shall conform to Factory Mutual requirements or as stated on section details, whichever is more stringent.
  - 5. Wood Blocking & Curbs: Lumber; #2 grade free from warping and visible decay; fire retardant treated (FRT) to meet AWPA C20 (lumber), and marked and in accordance with requirements indicated in Section 06100.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Inspect and approve the deck condition, slopes and fastener backing if applicable, stack vents, vent outlets, nailers and surfaces and elements.
- C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.
- D. If substrate preparation and other conditions are the responsibility of another installer,

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notify Architect of unsatisfactory preparation before proceeding.

## 3.2 **PREPARATION**

- A. General: Clean surfaces thoroughly prior to installation.
  - 1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
  - 2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.
  - **3**. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.
  - 4. Wherever necessary, all surfaces to receive roofing materials shall be power broomed and vacuumed to remove debris and loose matter prior to starting work.
  - 5. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.
  - 6. Fasteners and plates for fastening components mechanically to the substrate shall provide a minimum pull-out capacity of 300 lbs. (136 k) per fastener. Base or ply sheets attached with cap nails require a minimum pullout capacity of 40 lb. per nail.
  - 7. Prime decks where required, in accordance with requirements and recommendations of the primer and deck manufacturer.

## 3.3 INSTALLATION OF THE BASE SHEET / INSULATION / ROOFING BOARDS

- A. Base sheet attachment with Mechanical Fasteners.
  - 1. Contractor MUST have pull tests performed for each roof section with the approved base sheet fastener and submit to the Architect and manufacture for approval of fastener type and frequency/pattern.
- B. Insulation attachment with Mechanical Fasteners
  - 1. Approved insulation board shall be fully attached to the deck with an approved mechanical fastening system. As a minimum, the amount of fasteners shall be in accordance with manufacturer's recommendation for FM I-90 system. Fastener pattern shall be: Mid Roof, 8 fasteners per board, Perimeters, 12 fasteners per board and Corners, 16 fasteners per board.
  - 2. Filler pieces of insulation require at least two fasteners per piece if size of insulation is less than four square feet.
  - 3. Spacing pattern of fasteners shall be as per manufacturer's recommendations to meet the FM requirements. Placement of any fastener from edge of insulation board shall be a minimum of three inches, and a maximum of six (6) inches.
  - 4. Minimum penetration into deck shall be as recommended by the fastener manufacturer. There is a one (1) inch minimum for metal decks where not specified by the manufacturer.
- C. Insulation and recovery board attachment with Insulation Adhesive Approved by Factory Mutual (FM).

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- 1. Ensure all surfaces are clean, dry, free of dirt, debris, oils, loose ore embedded gravel, unadhered coatings, deteriorated membrane and other contaminants that may inhibit adhesion.
- 2. Apply insulation adhesive directly to the substrate using a ribbon pattern with threequarters (3/4) inch wide wet beads, 4 inches o.c., using either the manual applicator or an automatic applicator, at a rate of one (1) gallon per one hundred (150) square feet per cartridge.
- 3. Immediately place insulation boards into wet adhesive. Do not slide boards into place. Do not allow the adhesive to skin over before installing insulation boards.
- 4. Briefly step each board into place to ensure contact with the adhesive. Substrates with irregular surfaces may prevent the insulation board from making positive contact with the adhesive. Relief cuts or temporary weights may be required to ensure proper contact.
- 5. All boards shall be cut and fitted where the roof deck intersects a vertical surface. The boards shall be cut to fit a minimum of one quarter (1/4) inch away from the vertical surface.
- 5. Tape joints of recovery board as per manufacturer's requirements and specification below.
- D. Install modified bitumen membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.
- E. General: Avoid installation of modified bitumen membranes at temperatures lower than 40-45 degrees F. When work at such temperatures unavoidable use the following precautions:
  - 1. Take extra care during cold weather installation and when ambient temperatures are affected by wind or humidity, to ensure adequate bonding is achieved between the surfaces to be joined. Use extra care at material seam welds and where adhesion of the applied product to the appropriately prepared substrate as the substrate can be affected by such temperature constraints as well.
  - 2. Unrolling of cold materials, under low ambient conditions must be avoided to prevent the likelihood of unnecessary stress cracking. Rolls must be at least 40 degrees F at the time of application. If the membrane roll becomes stiff or difficult to install, it must be replaced with roll from a heated storage area.
- F. Commence installation of the roofing system at the lowest point of the roof (or roof area), working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water.

# 3.4 INSTALLATION OF COLD APPLIED MODIFIED BITUMINOUS MEMBRANE ROOF SYSTEM

A. Recovery Board Joints - Before installing the cold-applied modified bitumen roof system over the recovery board, ALL joints of the recovery board MUST be sealed with a 3-

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course application of mesh and cold-applied adhesive or specified roof board joint tape.

- B. Base Ply: Cut base ply sheets into 18 foot lengths and allow ply to relax before installing. Install base sheet in interply adhesive applied at the rate required by the manufacturer. Shingle base sheets uniformly to achieve one ply throughout over the prepared substrate. Shingle in proper direction to shed water on each large area of roofing.
  - 1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.
  - 2. Solidly bond to the substrate and adjacent ply with specified cold adhesive at the rate of 2 to 2-1/2 gallons per 100 square feet.
  - 3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Use care to eliminate air entrapment under the membrane. Apply pressure to all seams to ensure that the laps are solidly bonded to the roof recovery board. Lightly broom in the cap ply to assure complete adhesion.
  - 4. Install subsequent rolls of modified across the roof as above with a minimum of 4 inch side laps and 8 inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.
  - 5. Extend base ply to the top edges of cants at wall and projection bases. Seal top of membrane with asphalt mastic until the base flashing ply is installed.
  - 6. Install base flashing ply to all perimeter and projection details.
  - 7. Allow the one ply of base sheet to cure at least 30 minutes before installing the modified membrane. However, the modified membrane must be installed the same day as the base plies.
- C. Modified Cap Ply: Cut cap ply sheets into 18 foot lengths and allow ply to relax before installing. Install in interplay adhesive applied at the rate required by the manufacturer. Shingle sheets uniformly over the prepared substrate to achieve the number of plies specified. Shingle in proper direction to shed water on each large area of roofing.
  - 1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.
  - 2. Solidly bond to the base layers with specified cold adhesive at the rate of 2 to 2-1/2 gallons per 100 square feet.
  - 3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Care should be taken to eliminate air entrapment under the membrane. Apply pressure to all seams to ensure that the laps are solidly bonded to the base roof ply. Lightly broom in the cap ply to assure complete adhesion.
  - 4. Install subsequent rolls of modified across the roof as above with a minimum of 4 inch side laps and 8 inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.
  - 5. Allow cold adhesive to set for 5 to 10 minutes before installing the top layer of modified membrane.
  - 6. Extend membrane to the top edge of all cants in full mopping of the cold adhesive as shown on the Drawings. Seal top of membrane with asphalt mastic until the top flashing ply is installed.
  - 7. All excessive adhesive must be removed from the top edge of the selvage lap or underlying end lap prior to heat welding the laps.
  - 8. Where no compound is visible at edge of side lap or end lap, laps should be checked by probing the lap with a trowel after the membrane has cooled.
  - 9. Avoid stepping on side laps before they have been heat welded and rolled.

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Stepping on the lap can make it stick and tear when the lap is lifted for heat welding.

- 10. The corners of the underlying membrane at the end laps, and the corner of the selvage edge on the side laps at T-joints should be cut at a 45° angle with the width of the selvage edge (4").
- 11. **Heat weld** all seams with a Leister Variant or approved modified bitumen heat welding machine. Torching is not permitted. Hand weld T joints and hard to reach areas. Membrane without selvedge edge are to be butted together and sealed with a heat welded utility roll.
- 12. Aesthetics will be a punch list item. The roof must match the owner's standards for appearance. The desired result of heat welding the laps should be a small uniform pencil line bead of compound visible at all the laps.
- D. Fibrous Cant Strips: Provide non-combustible wood fiber cant strips at all wall/curb detail treatments where angle changes are greater than 45 degrees. Cant may be set in approved cold adhesives, hot asphalt or mechanically attached with approved plates and fasteners.
- E. Wood Blocking, Nailers and Cant Strips: Provide wood blocking, nailers and cant strips as specified in Section 06100.
  - 1. Provide nailers at all roof perimeters and penetrations for fastening membrane flashings and sheet metal components.
  - 2. Wood nailers should match the height of any insulation, providing a smooth and even transition between flashing and insulation areas.
  - **3**. Nailer lengths should be spaced with a minimum 1/8 inch gap for expansion and contraction between each length or change of direction.
  - 4. Nailers and flashings should be fastened in accordance with Factory Mutual "Loss Prevention Data Sheet 1- 49, Perimeter Flashing" and be designed to be capable of resisting a minimum force of 200 lbs/lineal foot in any direction.
- F. Metal Work: Provide metal flashings, counterflashing, metal edging as specified in Section 07600. Install in accordance with the SMACNA "Architectural Sheet Metal Manual" or the NRCA Roofing Waterproofing manual.
- G. Flashing Base Ply: Install flashing sheets by the same application method used for the base ply.
  - 1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
  - 2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
  - **3**. Adhere to the underlying base ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
  - 4. Solidly adhere the entire flashing ply to the substrate. Secure the tops of all flashings that are not run up and over curb through termination bar fastened at 6 inches (152 mm) O.C. and sealed at top.
  - 5. Seal all vertical laps of flashing ply with a three-course application of trowel-grade mastic and fiberglass mesh.

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- 6. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
- 7. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work.
- 8. Secure the top edge of the flashing sheet nailed 4 inches on center and covered with an acceptable counter flashing.
- H. Flashing Cap Ply: Install flashing cap sheets by the same application method used for the base ply.
  - 1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
  - 2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
  - 3. Adhere to the underlying base flashing ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
  - 4. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
  - 5. Coordinate roof accessories, miscellaneous sheet metal accessory items with the roofing system work.
  - 6. All stripping shall be installed prior to flashing cap sheet installation.
  - 7. Heat and scrape granules when welding or adhering at cut areas and seams to granular surfaces at all flashings.
  - 8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or screwed 4 inches on center and covered with an acceptable counter flashing.
  - 9. Heat weld all vertical laps of flashing membrane, or seal all vertical laps of flashing membrane with a three-course application of **Silver-Flash aluminized trowel-grade mastic and mesh.**
- I. Roof Walkways: Provide walkway pads in areas indicated on the drawings.

# 3.5 INSTALLATION ROOF PENETRATION FLASHING

- A. Flash all penetrations as specified below and per the project documents. If a specific detail is not shown in the drawings, or specified below, flash the detail in accordance with the manufacturer's specifications to comply with the specified warranty.
- B. Plumbing/Soil Stack:
  - 1. Minimum stack height is twelve (12) inches.
  - 2. Run roof system over the entire surface of the roof. Seal the base of the stack with mastic
  - 3. Prime flange of new lead sleeve. Install properly sized lead sleeve set in 1/4 inch bed of roof cement.
  - 4. Install base flashing ply in bitumen or the specified cold-applied flashing adhesive.

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- 5. Install modified membrane in bitumen or the specified cold-applied flashing adhesive.
- 6. Seal the intersection of the membrane and stack with the specified elastomeric asphaltic sealant.
- 7. Turn sleeve a minimum of one (1) inch down inside of stack. For pipes 2 inches or less in diameter, lead top caps will be required.
- C. Pre-manufactured Curb for Equipment Support (Secured to Roof Deck):
  - 1. Secure curb to roof deck. Minimum curb height above top of roof is eight (8) inches. Install wood blocking on bottom, or top, of curb to achieve this height. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
  - 2. Set cant in bitumen. Run base roofing ply over cant and to the top edge of the cant. Seal with asphalt mastic.
  - 3. Install base flashing ply in the specified cold applied flashing adhesive covering pre-manufactured curb with six (6) inches on to field of the roof.
  - 4. Install modified membrane over cant and to the top edge of the cant. Seal with asphalt mastic.
  - 5. Install modified flashing ply in the specified cold applied flashing adhesive over the base flashing ply, nine (9) inches on to field of the roof. Install flashing plies on top of the curb, and nail at eight (8) inches o.c. with cap nails. Apply a threecourse application of Silver-Flash mastic and mesh at all vertical seams.
  - 6. Install pre-manufactured cover. Fasten sides at twenty-four (24) inches o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape/sealant between metal covers.
  - 7. Set equipment on neoprene pad and fasten as required by equipment manufacturer.
- D. Curb Detail/Air Handling Station:
  - 1. Minimum curb height is eight (8) inches. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
  - 2. Set cant in bitumen. Run base roofing ply over cant and up to the tope edge of the cant. Seal with asphalt mastic.
  - 3. Install base flashing ply in specified cold applied flashing adhesive covering curb with six (6) inches on to field of the roof.
  - 4. Install modified membrane over cant and up to the top edge of the cant. Seal with asphalt mastic.
  - 5. Install modified flashing ply in the specified cold applied flashing adhesive over

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the base flashing ply, nine (9) inches on to field of the roof. Attach top of membrane to top of wood curb and nail at eight (8) inches o.c. Apply a three-course application of Silver-Flash mastic and mesh at all vertical seams.

- 6. Install pre-manufactured counterflashing/slip flashing with fasteners and neoprene washers or per manufacturer's recommendations.
- 7. Set equipment on neoprene pad and fasten as required by equipment manufacturer.
- E. Reglet Mounted Counterflashing:
  - 1. Remove existing reglet mounted counterflashing system to allow the installation of the new roof flashing and counterflashing system.
  - 2. Minimum flashing height is eight (8) inches. Maximum flashing height is twentyfour (24) inches. Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.
  - 3. Set cant in bitumen. Run field plies over the cant and up the wall a minimum of three (3) inches.
  - 4. Install base flashing ply covering wall set in the specified adhesive with six (6) inches on to field of the roof.
  - 5. Install modified membrane roofing ply over cant and up the wall a minimum of two (2) inches.
  - 6. Install modified flashing ply in the specified adhesive over the base flashing ply, nine (9) inches on to the field of the roof. Apply a three-course application of Silver-Flash mastic and mesh at all vertical seams.
  - 7. Install the specified termination bar even with the top of the flashing, and secure the termination bar through flashing and into wall every six (6) inches on center. Seal the top of the termination bar/flashing with a 3-course application of Silver-Flash and Garmesh or elastomeric asphaltic sealant.
  - 8. Cut reglet in masonry one joint above flashing, and one joint below the new throughwall flashing system.
  - 9. Install new reglet counterflashing with lead expansion wedges at 12" on center and seal reglet opening with high grade polyurethane sealant. End joints shall be interlocking and overlapping not less than 3". Corners shall be mitered and fabricated to a watertight condition. The bottom of the cap flashing insert shall project 1/4" from the face of the wall with a down turned drip edge (provide a down turned hem in areas subject to human contact). New counterflashing shall cover the termination bar a minimum of four (4) inches.
- F. Liquid Flashing:
  - 1. Mask target area on roof membrane with tape in accordance with manufacturer's requirements.

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- 2. Clean all non-porous areas with isopropyl alcohol.
- 3. Apply 32 wet mil base coat of liquid flashing over masked area.
- 4. Embed Grip Polyester polyester reinforcement fabric into the base coat of the liquid flashing.
- 5. Apply 48-64 wet mil top coat of the liquid flashing material over the fabric extending 2 inches (51 mm) past the scrim in all directions.
- 6. Apply minerals immediately or allow the liquid flashing material to cure 15-30 days and then install reflective coating.

# 3.6 WALKWAY / PROTECTION PADS INSTALLATION

A. Cut the walkway / protection pad into specified lengths and allow to relax until flat. Adhere the sheet using the specified adhesive. Apply the specified adhesive / sealant in a 3/8 inch wide beads in a 6" to 8" spiral to the back of the pad in accordance with the pattern as supplied by the walkway / protection pad supplier. Walk-in each pad after application to ensure proper adhesion. Use a minimum spacing of 2 inches between sheets to allow for proper drainage.

## 3.7 FIELD QUALITY CONTROL AND INSPECTIONS

- A. Inspection: Provide manufacturer's project inspections not less than three (3) days per week during 'work in-progress'. Manufacturer to provide regular reports with digital photos depicting work progress and quality.
  - 1. Warranty shall be issued upon manufacturer's acceptance of the installation.
  - 2. Field observations shall be performed by a Technical Representative employed fulltime by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
  - **3**. Provide observation reports from the Technical Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
  - 4. Provide a final report from the Technical Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.
- B. Site Condition: Leave all areas around job site free of debris, roofing materials, equipment and related items after completion of job.
- C. Notification of Completion: Notify the manufacturer by means of manufacturer's printed Notification of Completion form of job completion in order to schedule a final inspection date.
- D. Final Inspection
  - 1. Post-Installation Meeting: Hold a meeting at the completion of the project, attended by all parties that were present at the pre-job conference. A punch list of items required for completion shall be compiled by the Contractor and the

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manufacturer's representative. Complete, sign, and mail the punch list form to the manufacturer's headquarters.

**END OF SECTION 07535** 

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# **ROOF MEMBRANEPRODUCTS CERTIFICATE OF ANALYSIS**

DATE:

LOT NUMBER:

MATERIAL TYPE:

**DIMENSIONS & MASS AVERAGE TESTED VALUE** ACTUAL MINIMUM **±STANDARD DEVIATION** MINIMUM **SPECIFICATION** LENGTH (ft.): WIDTH (in.): THICKNESS AT SELVAGE (mils): TOTAL THICKNESS (mils): WEIGHT (lbs/roll): SELVAGE WIDTH (in.): **PHYSICAL & MECHANICAL PROPERTIES AVERAGE TESTED VALUE SPECIFICATION ±STANDARD DEVIATION** LOW TEMP. FLEXIBILITY (°F): **GRANULE EMBEDMENT** (avg. grams loss/sample): BREAKING LOAD (lbf/in.): ULTIMATE ELONGATION (%): COMPOUND STABILITY (°F): DIMENSIONAL STABILITY (%): **RESISTANCE TO THERMAL** SHOCK (%):

Note: Must be provided from Roof Membrane Manufacturer for each **Product.** 

## The Garland Company, Inc.

Warranty Number 0900909

Effective Date 09/30/2009

## Twenty Year (20) Years High Performance Built-Up Roofing System Warranty No Dollar Limit

Owner's Name & Address Egg Harbor Township Board of Education 13 Swift Drive Egg Harbor Township, NJ 08234 Contractor's Name & Address Patriot Roofing Inc 3 Compass Lane Eastampton, NJ 08060

Building Name	Davenport Elementary School	Roofing System	StressPly E Mineral
Roof Identification	Davenport Elementary School	Flashing System	FlexBase 80
Completion Date	09/30/2009	Square Footage	49,600

#### MANUFACTURER RESPONSIBILITIES

The Garland Company, Inc. (hereinafter referred to as "Garland"), a Corporation of the State of Ohio, warrants to the above named owner that, when the above specified roofing system is installed in accordance with current Garland approved specifications, Garland will pay all authorized costs of repairs to the roofing system necessary to stop any leaks which occur during a period of twenty (20) years, from the completion date, subject to the terms of this warranty. Leaks which occur only as a result of any of the following will be repaired:

- A. Deterioration of the roofing system or flashing system resulting from ordinary wear and tear by the elements.
- B. Workmanship on the part of the approved roofing contractor in the application of the roofing system.
- C. Splits or breaks in the roofing system not caused by structural movement or failure or movement of any material underlying the roofing system or base flashing.
- D. Blisters, wrinkles, ridges, fishmouths or open laps in the roofing system.
- E. Slippage of the roofing system or flashing system.

The original cost does not include the cost of removing any preexisting roofing. The costs of removal or replacement of all roofing system components except the above mentioned roofing system shall be borne by owner.

#### APPLICABILITY OF WARRANTY

This warranty is valid only when applied by a Garland approved roofing contractor for approved roofing system specifications. All repairs, changes, alterations, modifications and additions to the roofing system must be authorized in advance in writing by Garland. This warranty is not assignable, directly or indirectly as a result of the sale of the premises or otherwise. This warranty shall not be applicable if, in the sole judgment of Garland, any of the following shall occur:

- A. The roofing system is damaged by natural disasters including, but not limited to, fire, floods, lightning, hail, earthquakes, wind damage, etc..
- B. The roofing system is damaged by structural movement or failure or movement of any material underlying the roofing system or base flashing.
- C. The roofing system is damaged by acts of negligence, misuse or accidents including, but not limited to, use of roof for other than waterproofing the building, vandalism, civil disobedience or acts of war.
- D. Discoloration, cosmetic deterioration or change in the visual appearance of the roofing system or Garland's top coating.
- E. Damage to the roofing system resulting from:
  - 1. Infiltration or condensation of moisture in, through, or around walls, copings, building structure or underlying or surrounding areas.
  - 2. Lack of positive drainage.
  - 3. Movement or deterioration of metal adjacent or built into the roofing system or base flashing.
  - 4. Chemical contaminate attacks on the roofing system which have not been approved or accepted by Garland.
  - 5. Building design or construction.
  - 6. Traffic or storage of materials on roof.
  - 7. Defects in, failure or improper application of the underlying material used as a base upon which the roof is applied.
  - 8. Acts of parties other than manufacturer or authorized roofing contractor.
- F. Failure of owner to properly notify Garland in writing and receive written approval of:
  - 1. Changes in the usage of the building.
  - 2. Modifications or additions to the roofing system.
- G. Failure of owner to properly maintain the roof.

H. Failure of owner to comply with each and every term or condition stated herein.

Garland assumes no responsibility for damage that occurs to the structure or interior of the structure, including the contents therein, from any type of leaks or any other consequential damages. Garland's sole responsibility is the costs of repairs of the above mentioned roofing system.

#### **OWNER RESPONSIBILITIES**

In the event of a leak, owner will notify Garland immediately in writing after discovery of the leak. Garland will inspect the roofing system. If it is determined that the roof leaks were the direct result of warrantable items as delineated within the terms of this warranty, Garland will perform the repairs required to correct the roof leaks at no cost to owner.

Owner will notify Garland in writing within thirty (30) days of any proposed modification, repair or addition, on or through the roofing system or base flashing for each situation occurring after the completion date of this warranty prior to the commencement of same. Owner will also notify Garland in writing within thirty (30) days of changes in the original usage of the building. Drawings or plans showing the location of the proposed changes in the original usage of the building must be provided and approved by Garland.

ALL IMPLIED WARRANTIES INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXCLUDED FROM THE SALE OF PRODUCTS COVERED BY THIS WARRANTY.

Garland recommends owner participation in the Garland Roof Maintenance and Inspection Program.

This warranty becomes effective only upon full payment of all bills for supplies and installation of the Garland roofing system.

This warranty shall be construed under and in accordance with the laws of the State of Ohio. This warranty constitutes the sole and only warranty of the parties hereto and supersedes any prior understandings or written or oral warranties between the parties respecting the subject matter within.

In the event that any one or more of the provisions contained in this warranty shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision thereof, and this warranty shall be construed as if the invalid, illegal or unenforceable provision had never been contained therein.

## The Garland Company, Inc. 3800 East 91st Street, Cleveland, Ohio 44105

By	G. R. Olivier
Title	Secretary
Date	February, 09, 2021
Warran Owner h	7 Acceptance: reby accepts and agrees to the terms and conditions set forth in this warranty.

Owner			
Signed By			
Date			

# SECTION 07600 - FLASHING, SHEET METAL AND ROOF ACCESSORIES

## 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. Pre-manufactured metal flashing and counterflashing.
  - 2. Miscellaneous sheet metal accessories.
  - 3. Exposed metal field and shop fabricated sheet trim and fascia units, where indicated.
- B. Related Sections:
  - 1. Wood nailers and blocking: Section 06100.
  - 2. Roofing Materials: Elsewhere in Division 7.
  - 3. Roof Specialties and Accessories: Section 07800.
  - 5. Joint Sealer Assemblies: Section 07900.

## **1.3 PERFORMANCE REQUIREMENTS**

- A. Structural Requirements: Design and install work of this section, including attachment to the structure, to safely withstand dead, live and wind loads prescribed by the International Building Code.
- B. Environmental Requirements: Provide for expansion and contraction of system components due to air temperature and solar heat gain. Provide systems which will accommodate movement due to temperature change without buckling, failure of seals, undue stress on structural elements, reduction of performance, or other detrimental effects.
  - 1. Anticipated air temperature range: Minus 10°F to +105°F.

# 1.4 **REFERENCES**

- A. Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).
- B. ASTM B 32; Standard Specification for Solder Metal.
- C. ASTM B 209; Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- D. Aluminum Association, Design System for Aluminum Finishes (AA).
- E. American Architectural Manufacturers Association (AMMA), standards as referenced herein.
- F. ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roof Systems.

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## 1.5 SUBMITTALS

- A. Product Data: Manufacturer's Specifications, standard details, and installation recommendations.
- B. Shop Drawings: Submit manufacturer's shop drawings showing material types, thickness, sizes, shapes, connections, layout, joining, profiles and anchorage of fabricated work and relation to adjacent work. edited product data or shop drawings, or a combination thereof, as required to accurately describe products to be provided. Show elevations, field measurements, reinforcement, expansion provisions, installation accessories, and detail sections of composite members. Draw layouts at scale of 1/4 inch per foot, details at scale of 3 inches per foot.
  - 1. **Provide shop drawings for, but not limited to, the following:** 
    - a. Base flashing and counterflashing.
    - b. All other sheet metal work requiring fabrication.
    - c. Details of all joints for above.
    - d. Reglets and wedges.
  - 2. Sheet metal shop drawings shall be prepared to reflect SMACNA detail standards and in accordance with ANSI/SPRI ES-1 Test Protocols.
- C. Samples for Color Selection of Coated Finishes: Coating manufacturer's color selection data.
- D. Samples for Color Verification of Coated Finishes: For each type and color of coated finish submit 12-inch-long sections of extrusions and formed sections and 6-inch-square sheets.
- E. Pre-engineered fabricated and pre-finished sheet metal manufacturer's product literature, finish specification and sample finish warranty.
- F. Sheet metal fabricators and installers qualifications.

# 1.6 QUALITY ASSURANCE

- A. Listing Roof Perimeter Flashing System: Provide system listed in Factory Mutual System's "Approval Guide," classified for Zone 2 (I-90 windstorm resistance).
- B. Fabricator / Installer: A firm having a recommended minimum of 5 years of successful experience in fabrication and installation of sheet metal work of type and scope equivalent, to work of this section.
- C. Pre-engineered and Contractor: Fabricate and install sheet metal work in accordance with indicated reference standards.

# 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials off ground, under cover. Protect from damage and deterioration.
- B. Handle materials to prevent damage to surfaces, edges and ends of sheet metal items. Damaged material shall be rejected and removed from the site.

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## 1.8 WARRANTY

- A. Warrant gravel stop/fascia, coping, gutters, downspouts, scuppers system work to be free of defects in materials and workmanship, to resist blow-off and to be leak tight, due to conditions within stated design limits.
- B. Warrant Fluoropolymer coating to remain free, under normal atmospheric conditions, from peeling, checking, or cracking, and chalking in excess of numerical rating of 8 when measured in accordance with ASTM D659-86, or fading in excess of 5 N.B.S. units during warranty period.
  - 1. The Warranty period shall be **twenty (20) years** which starts the approved date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide pre-engineered manufactured products approved by the roofing system manufacturer(s) which may include but not limited to the following:
  - 1. Aluminum Reglets:
    - a. Fry Reglet Corporation,
    - b. Hickman: W.P. Hickman Co.,
    - c. Keystone Flashing Company,
    - d. CertainTeed, Saint-Gobain,
    - e. or approved equal.

## 2.2 METALS

- A. <u>Type "C"; Aluminum:</u> Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:
  - 1. <u>Type "C-4"; Factory-Painted Aluminum Sheet:</u> ASTM B 209, 3003-H14, with a minimum thickness of 0.040 inch, unless otherwise indicated.
- B. <u>Type "F"; Galvanized Steel Sheet:</u> ASTM A 526, G 90, commercial quality, or ASTM A 527, G 90, lock-forming quality, hot-dip galvanized steel sheet with 20% copper, mill phosphatized where indicated for painting; not less than 0.0396 inch thick, unless otherwise indicated.

## 2.3 **REGLETS**

- A. General: Provide reglets of type, material, and profile indicated, compatible with flashing. Form to securely interlock with counterflashing.
  - 1. <u>Type 5</u>: Roof Top Equipment Curb: Provide "MA" springlok Reglet by Fry Reglet Corp.; or approved equal.
    - a. 0.040" thick aluminum, with 1-1/2" top flange, color as selected by Architect.
    - b. Provide 3" minimum lap joints.

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2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing's lower edge.

# 2.4 COUNTERFLASHING

- A. Provide springlok counterflashing by Fry Reglet Corp.; Metal-Era; Xtreme Trim; or approved equal.
  - 1. 0.040" thick aluminum, as indicated on the Drawings.
  - 2. Provide inside and outside corners including special angle where required.

# 2.5 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. GENERAL REQUIREMENTS:
  - 1. All miscellaneous materials, accessories or other items essential to the completion of sheet metal installation, though not specifically shown or specified, must be provided.
  - 2. All such items, unless otherwise indicated on drawings or specified herein, shall be applied using sheet metal gauges which conform to recognized industry standards of sheet metal practices and without additional cost to the Owner. For sheet metal and pre-manufactured units, provide type of solder, ASTM B23, and corrosion-resistant metal as recommended by the producer of the metal sheets for fabrication and installation.
  - 3. Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, non-corrosive, size and gauge required for performance.
- B. Fasteners: Same metal as flashing/sheet metal, as indicated or other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
- C. Bituminous Coating: FS TT-C-494 or SSPC Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.
- D. Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.
- E. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed; comply with FS TT-S-00227, TT-S-00230, or TT-S-001543.
- F. Epoxy Seam Sealer: 2-part non-corrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.
- G. Paper Slip Sheet: 15-lb. rosin-sized building paper.
- H. Polyethylene Underlayment: 6-mil carbonated polyethylene film; FS L-P-512.

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# 2.6 FABRICATION, GENERAL

- A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
  - 1. Seams (Metal other than Aluminum): Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  - 2. Seams (Aluminum): Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
  - 3. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
  - 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
  - 5. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
  - 6. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
  - 7. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
    - A. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

# D. SHEET METAL FABRICATIONS

1. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements.

# 2.7 ALUMINUM FINISHES

A. General: Comply with Aluminum Association's (AA) "Designation System for Aluminum Finishes" for finish designations and application recommendations.

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- B. High-Performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's instructions.
  - 1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.
    - a. Color(s): As selected by the Architect from manufacturer's available full range of colors including custom colors.

# PART 3 - EXECUTION

# 3.1 **EXAMINATION**

- A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence.
- B. Verify that substrates and openings are rigidly set, at proper lines and elevation, properly sized, and ready to receive units.
- C. Do not proceed with installation until conditions detrimental to proper installation have been corrected.
- D. Coordinate installation with roofing work and other adjacent elements of building envelope to ensure watertight construction.

## 3.2 **PREPARATION**

- A. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- B. Isolate all dissimilar metals by means of a heavy bituminous coating, approved paint coating, adhered polyethylene sheet, or other means recommended by SMACNA.

## 3.3 INSTALLATION

- A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion in metal units. Set units true to line and level indicated. Install work with laps, joints, and seams permanently weatherproof and watertight.
- B. Sealed Joints: Form minimum 1-inch hooked joints and embed flange into sealant or adhesive. Form metal to completely conceal sealant or adhesive.
  - 1. Use joint adhesive for nonmoving joints specified not to be soldered.
  - 2. Moving Joints: When ambient temperature is moderate (40-70°F) at time of installation, set joined members for 50% movement either way. Adjust setting position of joined members proportionally for temperatures above 70°F. Do not install sealant at

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temperatures below 40°F. Refer to section on sealants elsewhere in Division 7 for handling and installation requirements for joint sealers.

- C. Workmanship: Install sheet metal work with lines, arises, and angles sharp and true. Exposed surfaces shall be free from visible waive, warp, buckle, and tool marks. Exposed edges shall be folded back neatly to form a ½-inch hem on the concealed side. Sheet metal exposed to the weather shall be watertight with provisions for expansion and contraction.
- D. Nailing: Nailing of sheet metal shall be confined generally to sheet metal having a maximum width of 18 inches. Nailing of flashings shall be confined to one edge only. Nails shall be evenly spaced not over 3 inches on centers and approximately ½-inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, detailed shop drawings shall include locations for sleepers and nailing strips required to properly secure the work.
- E. Cleats: Provide cleats for sheet metal 18 inches and over in width. Space cleats evenly not over 12 inches on centers unless otherwise specified or indicated. Unless otherwise specified, cleats shall be not less than 2 inches wide by 3 inches long, and of the same material and thickness as the sheet metal being installed. One end of the cleat shall be secured with two nails and the cleat folded back over the nailheads. The other end shall be folded back over the nailheads. The other end shall be soldered seams shall be pretinned.
- F. Bolts, Rivets and Screws: Install bolts, rivets, and screws where indicated or required. Provide compatible washers where required to protect surface of sheet metal and to provide a watertight connection.
- G. Seams; General: Comply with SMACNA, Figures 3-2 & 3-3, Tables 2-1 & 3-1R, and other applicable designs to specific installation.
  - 1. Seams: straight and uniform in width and height with no solder showing on the face.
  - 2. Flat-lock Seams for All Non-Moving Seams; Finish not less than 3/4-inch wide.
  - 3. Loose-lock Expansion Seams: Not less than 3 inches wide, and shall provide minimum one-inch movement within the joint. Joint shall be completely filled with the specified sealant, applied at no less than 1/8 inch thick bed. Sealants are specified in Section 07900 Joint Sealer Assemblies and shall be completely concealed.
  - 4. Flat Seams: Make seams in the direction of the flow.
- H. Soldering, Welding, and Mechanical Fastening: Where soldering is specified herein, it shall apply to copper and lead coated copper and galvanized metal items.
  - 1. Soldering: Cretin edges of sheet metals, except lead coated material, before soldering is begun. Soldering shall be done slowly with well heated soldering irons, so as to thoroughly heat the seams and completely sweat the solder through the full width of the seam. Edges of lead-coated material to be soldered shall be scraped or wire-brushes to produce a bright surface, and seams shall have a liberal amount of flux brushed in before soldering is begun.

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- 1. Counterflashing: Except where indicated or specified otherwise, insert counterflashing receiver in horizontal saw cut joints locations as indicated. Snap counterflashing in receiver and extend down vertical surfaces over upturned vertical leg or base flashings not less than 4 inches. Exposed edges of counterflashing shall be folded ½-inch. End laps in counterflashings shall be overlapped 6", and shall be made weathertight with sealant.
  - 1. Lengths of metal counterflashings shall not exceed 10 feet. The flashings shall be formed to the required shapes before installation. Corners shall be factory-formed with joints not less than 24 inches from the angle.
  - 2. Flashing receivers shall be secured in the horizontal joint with lead wedges spaced not to exceed 12 inches apart; on short runs, wedges shall be placed closer together.
  - 3. Counterflashing receiver joints shall be filled with caulking compound. Caulking is covered in Section 07900 Joint Sealer Assemblies.

# 3.4 PROTECTION FROM CONTACT OF DISSIMILAR MATERIAL

- A. Copper or Copper-Bearing Alloys: Surfaces in contract with dissimilar metal shall be painted with heavy bodied bituminous paint, or shall be separated by means of moisture-proof building felts.
- B. Aluminum: Surfaces shall not contact other metals except stainless steel, zinc, or zinc coating. Where aluminum contacts another metal, the dissimilar metal shall be painted with a primer followed by two coats of aluminum paint.
- C. All Metal: Surfaces in contact with mortar, concrete, or other masonry materials shall be painted with alkali-resistant coatings such as heavy-bodied bituminous paint.
- D. Wood or Other Absorptive Materials: Surfaces that may become repeatedly wet and in contact with metal shall be painted with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.
- E. Dissimilar Metal: Paint with a non-lead pigmented paint if drainage from it passes over aluminum.
- F. All fasteners shall be compatible with the metal with which it is connected.

# 3.5 **PROTECTION OF ROOFING**

- A. Protection of Applied Insulation: Completely cover each day's installation with finished roofing specified. Protect open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, until permanent roofing and flashing is applied. Storing, walking, wheeling, or trucking will not be permitted directly on insulation or on roofed surfaces. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary to distribute weight to conform to indicated live load limits of roof construction.
- B. Upon completion of roofing work (including associated work) Installer shall advise Contractor of recommended procedures for surveillance and protection of roofing during remainder of

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construction period. At end of construction period, or at a time when remaining construction work will in no way affect or endanger roofing (at Contractor's option), Installer shall make a final inspection of roofing and prepare a written report to Contractor with copy to Owner) describing nature and extend of deterioration or damage found in the work.

- C. Installer shall repair or replace (as required) deteriorated or defective work found at time of final inspection. Installer shall be engaged by Contractor to repair damages to roofing which occurred subsequent to roofing installation and prior to final inspection.
- D. Repair or replace the roofing and associated work to a condition free of damage and deterioration at time of substantial completion.

## 3.6 CLEAN-UP

- A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.
- B. Upon completion of the specified work, remove all waste, debris, unused material and equipment from the site. Remove all misplaced material from nearby surfaces. Leave the job in a clean condition, acceptable to Owner.
- C. Advise Contractors of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.

# END OF SECTION 07600

# SECTION 07800 - ROOF SPECIALTIES AND ACCESSORIES

# 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 DESCRIPTION OF WORK**

- A. Extent and locations of roof accessories is indicated on the Drawings and by provisions of this section.
- B. Type of units specified in this section includes the following:
  - 1. Prefabricated curb and support units.
  - 2. Pipe and conduit supports.
- C. Related Sections:
  - 1. Refer to roofing system sections, for roofing accessories to be built into roofing system (not work of this section).
  - 2. Section 05500 Metal Fabrications.
  - 3. Section 06100 Carpentry.
  - 4. Section 07600 Flashing, Sheet Metal and Roof Accessories.
  - 5. Section 07900 Joint Sealer Assemblies.
  - 6. Division 23 Mechanical Work.
  - 7. Division 26 Electrical Work

## 1.3 SUBMITTALS

- A. Product Data; Roof Accessories: Submit manufacturer's technical product data, rough-in diagrams, details, installation instructions and general product recommendations.
- B. Samples; Roof Accessories: Submit 2 samples, min. 8" square, of each exposed metal and plastic sheet materials, and 2 samples, min. 24" long, of formed or extruded exposed metal member; color and finish as specified.
- C. Coordination Drawings: Submit coordination drawings for items interfacing with or supporting mechanical or electrical equipment, ductwork, piping, or conduit. Indicate dimensions and locations of items provided under this section, together with relationships and methods of attachment to adjacent construction and to mechanical/electrical items.

# 1.4 QUALITY ASSURANCE

- A. Standards: Comply with SMACNA "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap-flashing to coordinate with type of roofing indicated. Comply with "NRCA Roofing and Waterproofing Manual" details for installation of units.
- B. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

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#### PART 2 - PRODUCTS

## 2.1 GENERAL PRODUCT REQUIREMENTS

A. Provide manufacturers' standard units, modified as necessary to comply with requirements. Shop fabricate each unit to greatest extent possible.

## 2.2 MATERIALS, GENERAL

- A. Zinc-Coated Steel: Commercial quality with 0.20 percent copper, ASTM A 525, G90 hot-dip galvanized, mill phosphatized.
- B. Stainless Steel: AISI TYPE 302/304, ASTM A 167, 2D annealed finish except as otherwise indicated, temper as required for forming and performance.
- C. Aluminum Sheet: ASTM B 209, alloy 3003, temper as required for forming and performance; anodized finish, except mill finish prepared for painting where indicated for field painting.
- D. Extruded Aluminum: Manufacturers standard extrusions of sizes and general profiles indicated, alloy 6063 T6, architectural grade aluminum; 0.078 inch minimum thickness for primary framing and curb member legs and 0.062 inch for dome retaining angle.
- E. Insulation: Manufacturer's standard rigid polyisocyanurate or semi-rigid board of glass fiber of thicknesses indicated.
- F. Wood Nailers: Softwood lumber, fire retardant treated wood, not less than 1-1/2" thick. Refer to Specification Section 06100.
- G. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.
  - 1. Where removal of exterior exposed fasteners affords access to building, provide non-removable fastener heads.
- H. Gaskets: Tubular or fingered design of neoprene or polyvinyl chloride, or block design of sponge neoprene.
- I. Bituminous Coating: FS TT-C-494A or SSPC-Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coating.
- J. Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.
- K. Elastomeric Sealant: Generic type recommended by unit manufacturer, which is compatible with joint surfaces; comply with FS TT-S-00227E, TT-S-00230C, or TT-S-001543A.
- L. Roofing Cement: ASTM D 2822, asphaltic.

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# 2.3 PREFABRICATED CURBS / EQUIPMENT SUPPORTS

- A. Comply with loading and strength requirements as indicated where units support other work. Coordinate dimensions with rough-in sheets or shop drawings of equipment to be supported. Fabricate of structural quality sheet steel (ASTM A 570, Grade as required) which has been prepared for painting and factory-primed and painted with 2-mil thickness of baked-on synthetic enamel, after fabrication.
  - 1. Fabricate with welded or sealed mechanical corner joints. Provide complete with cant strips and base profile coordinated with roof insulation thickness. Provide preservative-treated wood nailers at tops of curbs, coordinate with thickness of insulation and roof flashing as indicated, tapered as necessary to compensate for roof deck slopes of 1/4" per ft. and less.
  - 2. Except as otherwise indicated or required for strength, fabricate units of minimum 14-gauge (0.0747") metal, and to minimum height of 12".
  - 3. Sloping Roofs: Where slope of roof deck exceeds 1/4" per ft., fabricate curb/support units with height tapered to match slope, to result in level installation of tops of units.
- B. Manufacturers: Subject to compliance with requirements, manufacturers offering prefabricated thermally broken curbs/equipment supports which may be incorporated in the work include the following:
  - 1. Custom Curb, Inc.;
  - 2. The Pate Company;
  - 3. ThyCurb Div./ThyBar Corp.;
  - 4. Or approved equal.

## 2.4 PIPE AND CONDUIT SUPPORTS

- A. Comply with loading and strength requirements as indicated where units support other work.
- B. Basis of Design: Pillow Block Pipe stand as manufactured by Miro Industries, Inc.; or approved equal.
  - 1. Roller bearing pipe support designed to absorb thermal expansion and contraction of pipes and conduits. Pipes and conduits rest on self-lubricating roller which is a 304 stainless steel rod and a polycarbonate resin roller. Support base is polycarbonate resin.
  - 2. Load weight may not exceed manufacturer's stated capacity. Spacing of supports may not exceed manufacturer's stated maximum. Adjust all pipe stands so that each unit bears equal weight.
  - 3. For up to 3" I.D. (3.75" O.D.) pipe: Model 3-RAH-12.
  - 4. For 3" I.D. (3.75" O.D.) to 4" I.D. (5" O.D.) pipe: Model 4-RAH-12.
  - 5. For 4" I.D. (5" O.D.) to 6" I.D. (8.5" O.D.) pipe: Model 6-RAH-12.

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## 2.5 ALUMINUM FINISH(ES)

- A. General: Comply with Aluminum Association's (AA) "Designation System for Aluminum Finishes" for finish designations and application recommendations.
- B. High-Performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's instructions.
  - 1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.
    - a. Color and Gloss: As selected by Architect from manufacturer's full range of choices for color and gloss.

## PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. General: Comply with manufacturer's instructions and recommendations. Coordinate with installation of roof deck and other substrates to receive accessory units, and vapor barriers, roof insulation, roofing and flashing, as required, to ensure that each element of the work performs properly, and that combined elements are waterproof and weathertight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.
- B. Except as otherwise indicated install roof accessory items in accordance with construction details of "NRCA Roofing and waterproofing Manual".
- C. Isolation: Where metal surfaces of units are to be installed in contact with non-compatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation.
- D. Flange Seals: Except as otherwise indicated, set flanges of accessory units in a thick bed of roofing cement, to form a seal.
- E. Cap Flashing: Where cap flashing is required as component of accessory, install to provide adequate waterproof overlap with roofing or roof flashing (as counter-flashing). Seal with thick bead of mastic sealant, except where overlap is indicated to be left open for ventilation.

## 3.2 CLEANING AND PROTECTION

A. Clean exposed metal surfaces in accordance with manufacturer's instructions. Touch up damaged metal coatings.

## END OF SECTION 07800

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## SECTION 07840 - THROUGH-PENETRATION FIRESTOP SYSTEMS

## PART 1 - GENERAL

#### 1.1 **RELATED DOCUMENTS**

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

#### 1.2 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
  - 1. Walls and partitions.
  - 2. Smoke barriers.
  - 3. Construction enclosing compartmentalized areas.
- B. Related Sections include the following:
  - 1. Section 07200 Building Insulation, for safing insulation and accessories.
  - 2. Division 7 Section "Sprayed Fire-Resistive Materials."
  - 3. Division 22 and 23 Sections specifying duct and piping penetrations and firestop systems to be performed by the Plumbing and HVAC work Subcontractors.
  - 4. Division 26 Sections specifying cable and conduit penetrations and firestop systems to be performed by the Electrical Subcontractor.

## **1.3 PERFORMANCE REQUIREMENTS**

- A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
  - 1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
  - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
  - 3. Fire-resistance-rated floor assemblies.
  - 4. Fire-resistance-rated roof assemblies.

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- B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
  - 1. Penetrations located outside wall cavities.
  - 2. Penetrations located outside fire-resistive shaft enclosures.
  - 3. Penetrations located in construction containing fire-protection-rated openings.
  - 4. Penetrating items larger than 4-inch-diameter nominal pipe or 16 sq. in. in overall cross-sectional area.
- D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
  - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
  - 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
  - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- E. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

## 1.4 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.
  - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.

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- 2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architect and Owner, and other information specified.
- D. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.
- E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Installer Qualifications: An experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualification on buyer.
- C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
- D. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
  - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL. or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
  - 2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
    - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
    - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
      - 1) UL in "Fire Resistance Directory."
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

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## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi component materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

## 1.7 **PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

## 1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Notify Contractor's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Contractor's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

## PART 2 - PRODUCTS

## 2.1 **PRODUCTS / MANUFACTURERS**

- A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application in the Through-Penetration Firestop System Schedule at the end of Part 3 and as shown on drawings and as produced by one of the following manufacturers:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Hilti Construction Chemicals, Inc.
  - 2. Isolatek International.

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- 3. Nelson Firestop Products.
- 4. 3M Fire Protection Products.
- 5. Or approved equal.

# 2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
  - 1. Permanent forming/damming/backing materials, including the following:
    - a. Slag-/rock-wool-fiber insulation.
    - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    - c. Fire-rated form board.
    - d. Fillers for sealants.
  - 2. Temporary forming materials.
  - 3. Substrate primers.
  - 4. Collars.
  - 5. Steel sleeves.

## 2.3 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

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- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- I. Silicone Foams: Multi component, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
  - 1. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

## 2.4 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## PART 3 - EXECUTION

## 3.1 **EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 **PREPARATION**

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.

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- 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
- 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

## 3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

## 3.4 FIELD QUALITY CONTROL

- A. Inspecting Agency: The Contractor will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.
  - 1. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.
- B. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.

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C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

# 3.5 **IDENTIFICATION**

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
  - 1. The words: "Warning--Through-Penetration Firestop System-Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
  - 4. Date of installation.
  - 5. Through-penetration firestop system manufacturer's name.
  - 6. Installer's name.

# 3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

# 3.7 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to the alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
  - 1. Firestop Systems with No Penetrating Items: Comply with the following:
    - a. Latex sealant.
    - b. Silicone sealant.
    - c. Intumescent putty.
    - d. Mortar.

## END OF SECTION 07840

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## SECTION 07900 - JOINT SEALER ASSEMBLIES

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Part 1 through Part 6 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes joint sealant assemblies for the following applications which include performances of materials, installation requirements, as indicated herein in this specification and as specified by cross references in other Parts 1 through 6 specification sections.
- B. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
  - 1. Control and expansion joints in unit masonry.
  - 2. Joints between different materials.
  - 3. Perimeter joints between materials listed above and frames of storefront systems, as applicable.
  - 4. Other joints, as indicated.
- C. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
  - 1. Perimeter joints of exterior openings, where indicated.
  - 2. Tile control and expansion joints.
  - 3. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
    - a. Perimeter joints between interior wall surfaces and frames of interior doors, storefront systems.
    - b. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - c. Other joints, as indicated.
  - 4. Interior joints in the following horizontal traffic surfaces:
    - a. Control and expansion joints in cast-in-place concrete slabs.
    - b. Control and expansion joints in tile flooring.
    - c. Other joints, as indicated.
- D. Preparation of all joints to be sealed.
- E. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:
  - 1. Cutting out as needed to give proper depth.
  - 2. Installation of proper back up material for each joint.

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- 3. Cleaning to remove all dust, dirt, oil films, loose material etc.
- 4. Masking of adjacent surfaces.
- 5. Priming of joint surfaces.

## 1.3 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Where fire rated joint assemblies are indicated, provide materials and construction which are identical to those of assemblies whose fire endurance has been determined by testing in compliance with the following requirements, tested by a recognized testing and inspecting organization or by another means, as acceptable to authority having jurisdiction.
  - 1. Fire Testing: ASTM E 119/UL 263.
  - 2. Surface Burning Characteristics: ASTM E84/UL 723.
    - a. Flame Spread: 15
    - b. Smoke Developed: 0
  - 3. Through Penetration Firestopping: ASTM E814/UL 1479.
  - 4. Fire Resistance of Building Joint Systems: UL 2079
- B. VOC Content of Interior Sealants and Sealant Primers: Comply with the following limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Sealants: Not more than 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: Not more than 250 g/L.
  - 3. Sealant Primers for Porous Substrates: Not more than 775 g/L.
- C. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
  - 1. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
  - 2. Preconstruction Compatibility and Adhesion Testing: Submit to joint sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
    - a. Use manufacturers standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
    - b. Testing will not be required if joint sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
    - c. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates as follows:
      - (1) Locate test joints where indicated or, if not indicated, as directed by

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Architect.

- (2) Conduct field tests for each application indicated below:
  - (a) Each type of elastomeric sealant and joint substrate indicated.
  - (b) Each type of nonelastomeric sealant and joint substrate indicated.
- (3) Notify Architect seven days in advance of dates and times when test joints will be erected.
- (4) Sealant Manufacturer Responsibility:
  - (a) Manufacturer shall provide Technical Representative to perform Sealant Joint Field Pull Test. Manufacturer Sales representative is not acceptable to perform Field Pull Test.
  - (b) Technical Representative performing Field Pull Test must be an employee of the Sealant Manufacturer. Outside Sales Agent or Contract Technical Representative is not acceptable to perform Field Pull Test.
- (5) Test Method: Test joint sealants by hand-pull method described below:
  - (a) Install joint sealants in 60-inch long joints using same materials and methods for joint preparation and joint-sealant installation required for the completed Work. Allow sealants to cure fully before testing.
  - (b) Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.
  - (c) Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
  - (d) For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.
- (6) Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
- (7) Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.
- 3. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution:
  - a. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.
  - b. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
- 4. PROJECT CONDITIONS
  - a. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
    - (1) When ambient and substrate temperature conditions are outside limits

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permitted by joint sealant manufacturer.

- (2) When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40°F.
- (3) When joint substrates are wet.
- b. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- c. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.
- D. Special Project Warrantee and Guarantee:
  - 1. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
    - a. Warranty Period: **Five (5) years** from approved date of Substantial Completion.
  - 2. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing 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.
    - a. Warranty Period: **Five (5) years** from approved date of Substantial Completion.
  - 3. Guarantee shall further state that all exterior sealant will be guaranteed against:
    - a. Adhesive or cohesive failure in joints where movement is under maximum 25% extension or compression.
    - b. Any crazing greater than 3 mils in depth developing on surface of material.

## 1.4 SUBMITTALS

- A. Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application, include color samples showing full range of colors available, for each product exposed to view.
  - 1. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
- B. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

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## 1.6 **PROJECT CONDITIONS**

- A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers.
  - 2. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40°F (4.4°C).
  - 3. When joint substrates are wet due to rain, frost, condensation, or other causes.
- B. Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

## **PART 2 - PRODUCTS**

## 2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealers, joint fillers 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. Colors: Provide color of exposed joint sealers indicated or, if not otherwise indicated, as selected by Architect from manufacturer's available full range of standard and optional colors.
- C. Grade of Sealant: For each application, provide the grade of sealant (nonsag, self-leveling, no track, knife grade, etc.) as recommended by the manufacturer for the particular condition of installation (location, joint shape, ambient temperature, and similar conditions) to achieve the best possible overall performance. Grades specified herein are for normal condition of installation.

## 2.2 MISCELLANEOUS MATERIALS

- A. Joint Primer/Sealer: Provide the type of joint primer/sealer recommended by the sealant manufacturer of the joint surfaces to be primed or sealed.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.
- C. Sealant Backer Rod: Provide materials which are in compliance with ASTM D 1056; compressible rod stock of polyethylene foam, polyethylene jacketed polyurethane foam. butyl rubber foam, neoprene foam or other flexible, permanent, durable non-absorptive material as recommended for compatibility with sealant by the sealant manufacturer.

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- 1. Materials shall be capable of remaining resilient at temperatures down to minus 26°F.
- D. Joint Fillers:
  - 1. Joint Fillers for Interior Concrete Slabs: Provide "Ceramar" flexible foam expansion joint, as manufactured by W.R. Meadows, Inc.; or approved equal.
    - a. Flexible foam expansion joint filler composed of a unique synthetic foam of isomeric polymers in a very small, closed-cell structure. Gray in color, Ceramar is a lightweight, flexible, highly resilient material offering recovery qualities of over 99%. The compact, closed-cell structure will absorb almost no water.
    - b. Non-impregnated and will not stain or bleed.
    - c. Non-gassing.
    - d Complies with:
      - (1) ASTM D 5249, Type 2,
      - (2) ASTM D 1752, Sections 5.1 5.4, with compression requirement modified to 10 psi minimum and 25 psi maximum,
      - (3) ASTM D 7174-05.

# 2.3 SEALANTS

- A. <u>Sealant Type 1:</u> For all control and expansion joints in concrete slabs on grade, two-part, self leveling polyurethane traffic grade sealant, complying with, and ASTM C 920 and ASTM D 1850.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. "NR-200 Urexpan"; Pecora Corporation.
    - b. "THC 900/901"; Tremco, an RPM Co.
    - c. "Sikaflex-2c SL"; Sika Corporation.
    - d. Or approved equal.
  - 2. Color to be selected by the Architect.
- B. <u>Sealant Type 2</u>: For sealing exterior joints, provide a Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. "Spectrum 1 / Spectrum 800"; Tremco, an RPM Co.
    - b. "SikaSil WS290"; Sika Corporation
    - c. "Dowsil 790 Silicone Building Sealant; Dow Corning Corporation
    - d. Or approved equal.
- C. <u>Sealant Type 3:</u> For all interior joints, provide a one-part, non-sag, moisture- curing polyurethane rubber sealant, complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT, M, A, O and as recommended by manufacturer for general use as an interior exposed building construction conditions sealant including floor tiles in Toilets and Kitchens Section 09300.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. "Dynatrol I-XL"; Pecora Corporation.
    - b. "Dymonic or Dymonic FC for cold weather"; Tremco, an RPM Co.

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- c. "Chem-Calk 900 /915/945"; Bostik Inc.
- d. "Sikaflex 1a or Sikaflex 15LM"; Sika Corporation.
- e. Or approved equal.
- D. <u>Sealant Type 4:</u> For all joints at plumbing fixtures, provide one-part, neutral-curing, silicone rubber sanitary sealant, complying with ASTM C920; and containing fungicide for mildew resistance recommended by manufacturer for use at joints for plumbing fixtures; tub and shower, sinks countertops, appliances, etc.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. "898 Silicone"; Pecora Corporation.
    - b. "Tremsil 200"; Tremco, an RPM Co.
    - c. "786 Mildew Resistant"; Dow Corning.
    - d. "Sikasil N-Plus"; Sika Corporation.
    - e. Or approved equal.
- E. <u>Sealant Type 5:</u> For all interior joints between drywall partitions, CMU walls, hollow metal framing, cabinet heater, other metal mechanical or electrical assemblies, (sealant work performed by other trades and cross- referenced to the work of this section), etc., where all adjacent surfaces will receive paint:
  - 1. Latex Sealant: Non-elastomeric, one part, non-sag, paintable latex sealant recommended for exposed joints applications, complying with ASTM C 834, Type P (opaque sealants), Grade NF.
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. "AC-20 Plus Silicone"; Pecora Corporation.
    - b. "Tremflex 834"; Tremco, an RPM Co.
    - c. "Sonolastic Sonolac"; Sonneborn Building Products Div., ChemRex, Inc.
    - d. Or approved equal.

## F. <u>Sealant Type 6:</u> Hybrid Sealants (Silyl-Terminated Polyether (STPE) Joint Sealants

- 1. **STPE, S, NS, 50, NT**: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
  - a. Uses: Interior and exterior horizontal and vertical joints of door and window perimeters, expansion and control joints, coping and coping to facade joints, EIFS and architectural panels, fiber cement panels, etc.
  - b. Products: Subject to compliance with requirements, provide one of the following:
    - 1) "DynaTrol® I-XL Hybrid" as manufactured by Pecora Corporation. Available in ten (10) colors.
    - 2) "DynaTrol® I-XL Hybrid FTH" as manufactured by Pecora Corporation. Field tintable, available in fifty (50) colors.
    - 3) Equivalent by Tremco, an RPM Co.
    - 4) Equivalent by Sika.
    - 5) Equivalent by Dow Corning.
    - 6) Or approved equal.

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## 2.4 FIRE RATED JOINTS

- A. Construction fire rated joint assemblies shall meet indicated fire rating performance requirements. Provide assemblies where required and as indicated on the drawings with the following components:
  - 1. Joint Filler: Subject to compliance with indicated requirements, provide one of the following:
    - a. "Ultra Block", as manufactured by Backer Rod Manufacturing,
    - b. "Cerablanket"; Tremco,
    - c. ThermaFiber
    - d. Or approved equal.
    - e. Provide fire rated joint filler in thickness and shape as required to fill joints.
  - 2. Joint Sealant: Subject to compliance with requirements, provide one of the following: a. "Dynatrol II"; Pecora Corporation.
    - b. "Tremstop Acrylic"; Tremco, Inc, or "Trimstop IA, Intumescent Acrylic, Tremco, Inc.
    - c. "Sikaflex-2c NS"; Sika Corporation.
    - d. Equivalent by Dow Corning.
    - e. Or approved equal.

## PART 3 - EXECUTION

## 3.1 **EXAMINATION**

A. Examine joints indicated to receive joint sealers, with Installer present, compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer-performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:
- B. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellants; water; surface dirt; and frost.
- C. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar 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 sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
- D. Remove laitance and form release agents from concrete.

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- E. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile; and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
- F. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.
- G. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which 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.
- H. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of joint fillers.
  - 2. Do not stretch, twist, puncture, or tear joint fillers.
  - 3. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.
- I. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.
- J. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.
- K. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

## 3.3 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

## END OF SECTION 07900

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## **SECTION 08110 - HOLLOW METALWORK**

## 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 DESCRIPTION OF WORK**

- A. Extent of hollow metalwork for frames is indicated and scheduled on the Drawings.
- B. Related Sections:
  - 1. Section 04200 Masonry Work.
  - 2. Section 07900 Joint Sealer Assemblies.
  - 3. Section 08211 Wood Doors.
  - 4. Section 08700 Finish Hardware.
  - 5. Section 09250 Gypsum Drywall
  - 6. Section 09900 Painting.

#### 1.3 QUALITY ASSURANCE

- A. Provide frames complying with the following:
  - 1. Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames" (SDI-100) and as herein specified.
  - 2. American National Standard Institute:
    - a. ANSI Standards A156 Series for Hardware.
    - b. ANSI A115 Steel Door Preparation Standards.
- B. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated frame assemblies that have been tested, listed, and labeled in accordance with ASTM E 152 "Standard Methods of Fire Tests of Door Assemblies" by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction, (i.e., UL., Warnock Hersey).

## 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data substantiating that products comply with requirements.
- B. Shop Drawings: Submit for fabrication and installation of steel frames. Include details of each frame type, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
  - 1. Provide schedule of frames using same reference numbers for details and openings as those on contract drawings.

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C. Samples: Full range of color samples for Architect selection; 2 samples, 6" square min., of each color and texture as selected for factory-finished frames.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Before shipping, label each frame with metal or plastic tags to show its location, size, door swing, and other pertinent information. Deliver hollow metal work cartoned or crated to provide protection during transit and job storage.
- B. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.
- C. Store frames at building site under cover. Place units on minimum 4" high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber.

## PART 2 - PRODUCTS

## 2.1 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering steel frames which may be incorporated in the work include; but are not limited to, the following:
  - 1. Steelcraft, a Division of Allegion.
  - 2. Republic Doors and Frames, a Division of Allegion.
  - 3. Ceco Door Products, a Division of Assa Abloy.
  - 4. Curries Company, a Division of Assa Abloy.
  - 5. Or approved equal.

## B. <u>Substitutions: Substitution of products will only be considered when the Contractor /</u> <u>Door Supplier have submitted, to the Architect, all appropriate documents and in the</u> <u>time frame as outlined in the requirements indicated in AIA A201 and Section 00800.</u>

## 2.2 MATERIALS

- A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.
- B. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A1008 and ASTM A 568.
- C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526, with ASTM A 525, G60 zinc coating, mill phosphatized.
- D. Supports and Anchors: Fabricate of not less than 18-gauge galvanized sheet steel.
- E. Inserts, Bolts, and Fasteners: Manufacturer's standard units.

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- F. Shop Applied Paint:
  - 1. Primer: Rust-inhibitive enamel or paint, either air-drying or baking, capable of passing a 100 hours salt spray and 250 hours humidity test in accordance with ASTM test methods B 117 and D 3322 and shall be suitable as a base for specified finish paints indicated in specification section 09900.

# 2.3 ACCESSORIES

- A. Inserts: For required anchorage into concrete work, furnish inserts of cast iron, malleable iron or 12 gauge steel hot-dip galvanized after fabrication.
- B. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled in, expansion bolt anchors.

# 2.4 FABRICATION, GENERAL

- A. Fabricate frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site.
- B. Fabricate frames, concealed stiffeners, reinforcement, from either cold-rolled or hot-rolled steel (at fabricator's option).
- C. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.
- D. Finish Hardware Preparation: Prepare frames to receive finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.
- E. Reinforce frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
- F. Locate finish hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware", published by Door and Hardware Institute.

## 2.5 STANDARD STEEL FRAMES

- A. Provide metal frames for doors of types and styles as shown on Drawings and schedules. Conceal fastenings, unless otherwise indicated.
  - 1. Fabricate frames of minimum 16-gauge cold-rolled furniture steel at interior locations.
  - 2. Fabricate frames with mitered and (face welded / full profile welded).
- B. Hardware reinforcing shall be as follows:
  - 1. All frames are to be mortised reinforced, drilled and tapped in factory for all template

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mortise hardware, in accordance with "Approved" Finish Hardware Schedule and templates as provided by the Hardware Supplier. Where surface mounted hardware is to be applied, all frames shall have reinforcing plates.

- 2. Reinforcement plates shall be as follows:
  - a. Hinge Preps:
    - 1) Masonry: For "F" Series: 7 gauge, minimum.
    - 2) Metal Stud/Drywall: For "DW" Series: 7 gauge, minimum.
  - b. Strike Preps:
    - 1) Masonry: For "F" Series: 12 gauge, minimum.
    - 2) Metal Stud/Drywall: For "DW" Series: 12 gauge, minimum.
  - c. Closure Reinforcement: All Series 12 gauge, minimum.
  - d. Surface mounted hardware: All Series 12 gauge, minimum.
- 3. Base anchors for frames to be installed in masonry and drywall wall and partition assemblies, shall be adjustable type, shipped loose and to be 14 gauge, minimum.
- 4. Jamb Anchors:
  - a. For "F" Series frames in masonry walls provide adjustable wire type anchors (0.156" dia.), or strap type anchors (16 gauge), and "DW" Series frames in metal stud / drywall walls field adjustable compression anchors, provide quantities as follows:
    - 1) Frames up to 7'-6" in height: 3 per jamb.
    - 2) and one (1) adjustable base anchor per jamb.
- 5. Reinforce heads and jambs where indicated on Drawings with 10 gauge channel, continuously welded to frame.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. General: Install standard steel frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.
- B. Placing Frames: Comply with provisions of SDI-105 "Recommended Erection Instructions For Steel Frames", unless otherwise indicated.
- C. <u>Place frames prior to construction of enclosing walls and ceilings. Set frames accurately</u> <u>in position so that the head and jambs of the frame are square, plumb, aligned, and</u> <u>braced securely until permanent anchors are set.</u> After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
- D. In masonry construction, locate 3 wall anchors per jamb at hinge and strike levels.
- E. Install fire-rated frames in accordance with NFPA Std. No. 80.
- F. In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels, or as indicated. In open steel stud partitions, place studs in wall anchor notches and wire tie. In closed steel stud partitions, attach wall anchors to studs with tapping screws. Use indicated anchors and as per manufacturer's recommendations.

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# 3.2 ADJUST AND CLEAN

- A. Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- B. Check and re-adjust operating Finish Hardware items, without causing any damage to frames. Provide complete work for frames, leave clean and in proper operating conditions.

## END OF SECTION 08110

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## SECTION 08211 - 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.
- B. Related Sections:
  - 1. Section 01800 Time of Completion and Liquidated Damages
  - 2. Section 04200 Unit Masonry
  - 3. Section 08110 Hollow Metalwork
  - 4. Section 08700 Finish Hardware
  - 5. Section 08800 Glass and Glazing
  - 6. Section 09900 Field Painting of metal lites

## 1.2 SUMMARY

- A. Extent and location of each type of flush wood door is indicated on Drawings and in the door schedule.
- B. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive plained before veneering. Assembly of face veneer and crossband to core in accordance with WDMA.
  - 1. Structural Composite Lumber (SCL) with wood edge: Compatible species as face veneer.
  - 2. Solid core 20 min. labeled flush Structural Composite Lumber (SCL) with wood edge: Compatible species as face veneer.
- C. Shop-priming of wood doors is included in this Section.
- D. Factory-finishing of wood doors is included in this Section.
- E. Factory-prefitting to frames and factory-premachining for hardware for wood doors is included in this Section.

## 1.3 QUALITY ASSURANCE

- A. Construction per WDMA I.S. 1A 11.
- B. Fire-Rated Wood Doors: Provide wood doors which are identical in materials and construction to units tested in door and frame assemblies per ASTM 2074-00 Fire Test (Category A Positive Pressure). For mineral core doors, provide composite blocking with improved screw holding capability as needed to eliminate through-bolting of hardware. They are to be labeled and listed for ratings indicated by UL, Warnock Hersey or other testing and inspection agency acceptable to authorities having jurisdiction. Fire labels shall be affixed at the factory of the door manufacturer, and shall be from the Underwriter's or Warnock Hersey

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Testing Laboratories. Each label shall show the testing time of the label, and no approval will be given to "Construction Type" labels.

- 1. All "Category A" doors shall have concealed intumescent seals.
- C. Door Construction Field Examination: Upon direction of the Architect, the Contractor may be instructed to destroy a randomly selected wood door or panel by sawing it in half, vertically and horizontally, to verify conformance of the contract requirements. If the door(s) do not meet the specifications, all of the doors delivered for the project will be rejected, and the doors shall be replaced at the Contractor' expense. Further door inspection, to insure conformity to specifications, shall also be at the expense of the Contractor.
  - 1. <u>All such delays as a result of the fabrication and delivery of non-compliant doors which</u> vary from the processed shop drawing submittal will be the responsibility of the <u>Contractor (refer to Section 01800 for Liquidated Damages).</u>

## 1.4 **REFERENCE STANDARDS**

- A. Comply with the applicable requirements of the following standards unless otherwise indicated.
  - 1. Window & Door Manufacturers Association (WDMA)
    - a. I.S. 1A 11 Architectural Wood Flush Doors (WDMA).
    - b. Standard Procedures and Recommendations for Factory Machining Flush Wood Doors for Hardware.
  - American National Standards Institute

     ANSI A115. W Series, Wood Door Hardware Standards.
  - Underwriter's Laboratories, Inc. (UL)
     a. UL 10C Fire Test
  - 4. American Society for Testing and Materials:a. ASTM 2074-00 (Category A Positive Pressure) Fire Tests of Door Assemblies.

## 1.5 SUBMITTALS

- A. The shop drawing submittal <u>will not</u> be reviewed by the Architect unless a <u>complete shop</u> <u>drawing submittal</u> (technical data, details of core and edge construction, location and extent of hardware blocking, fire ratings, factory finish samples, 8" x 10" minimum for finish and 4" x 5" minimum for construction assembly) are made as one complete submittal, by the Contractor, and will be returned to the Contractor if incomplete.
  - 1. Subsequent delays as a result of an incomplete submittal will be the responsibility of the Contractor (refer to Section 01800 for Liquidated Damages).
- B. Product Data: Door manufacturer's technical data for each type of door, including details of core and edge construction, trim for openings, and factory-finishing Specifications.
  - 1. Include certifications as may be required to show compliance with Specifications.

- 2. <u>The door manufacturer's shop drawing literature which may include language for the substitution of door construction at the option of the manufacturer is not permitted.</u> Doors which are switched will be rejected and all costs associated with the manufacturing of the door type(s) specified will be by the Contractor/Manufacturer.
- C. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.
  - 1. For factory-premachined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light openings.
- D. Samples: Submit samples, 8" x 10" minimum for finish and 4" x 5" minimum for construction assembly, for the following:
  - 1. Doors for Transparent Finish: Flat samples illustrating finish and color of wood grain for each species of veneer and solid hardwood lumber required.
  - 2. Factory-Finished Doors: Each type of factory finish required.
  - 3. Metal Frames for Light Openings: Manufacturers product samples or product cut sheets for light frames and color selector guide for each material and finish required.
- E. Warranties and Certification Markings: Furnish with shop drawings:
  - 1. Door supplier must attest, in writing addressed to Architect, that the order has been placed in conformance with Specification requirements in all respects.
  - 2. All doors shall carry a "Lifetime" guarantee, including rehang and finish for all door(s) which do not comply with the manufacturer's warranty.
  - 3. Copy of Warranty shall be given to the Architect and Owner prior to the completion of the project.
  - 4. All doors shall be factory marked, on the top of the door, showing the order number, item number on the order, size of finished door, material, and core construction, for future information should replacement of the door be necessary.
- F. The Wood Door Supplier shall provide a letter indicating all of the following:
  - 1. The wood door supplier has completely reviewed the Bid Documents (Drawings, Specifications and Addenda) and has worked with the distributor in the preparation and submission of a complete shop drawing submittal to the Architect.
  - 2. The wood door supplier shall attest that the order has been placed in accordance with the Bid Document Drawings, Specifications and Addenda,
  - 3. The wood doors ordered and delivered to the job site are in conformance with the requirements of the job and per the approved shop drawings.

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## 1.6 **PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with requirements of referenced standards and recommendations in WDMA pamphlet "How to Store, Handle, Finish, Install, and Maintain Wood Doors", as well as with manufacturer's instructions.
- B. Protect all doors from damage and moisture under cover. Use wood blocking under horizontally stored doors. At no time will doors be allowed to come in contact with floor or water.
  - 1. The location where the doors are being stored on the job site shall be between 25 55% relative humidity. The Contractor shall forward independent certified testing that confirms compliance.
- C. All doors not finished at factory must be sealed on all surfaces within one (1) week after arrival at jobsite.
- D. Remove all damaged doors from jobsite prior to completion of project.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Basis of Design: Provide "Heritage Collection" wood doors as manufactured by VT Industries; or approved equal.
  - 1. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.
  - 2. Comparable products from other manufacturers will be considered if it can be clearly shown that their products are tested, equal to or will exceed the construction quality requirements, intended performances and all other design attributes listed above and provided that deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances as judged solely by the Architect.
    - a. Eggers Industries; Architectural Flush Doors Division, a VT Industries company,
    - b. "Aspiro™ Series I Marshfield-Algoma™",
    - c. Or approved equal.
  - 3. The use of one manufacturer's catalog numbers, and the specific requirements set forth in Drawings and Specifications are not intended to preclude the use of other manufacturer's products or procedures which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.
  - 4. <u>Substitutions: Substitution of products will only be considered when the Contractor/</u> <u>Door Supplier have submitted, to the Architect, all appropriate documents and in the</u> <u>time frame as outlined in the requirements indicated in AIA A201 and Section</u> <u>00800.</u>

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## 2.2 MATERIALS AND COMPONENTS

- A. General: Provide wood doors complying with applicable requirements of referenced standards for kinds and types of doors indicated and as specified.
- B. Solid Core Doors for Transparent Finish: Comply with the following requirements:
  - 1. At existing buildings, provide veneer faces to match the species of the existing veneer or as directed by the Architect.
  - 2. Aesthetic Grade: Custom, with Grade A faces
  - 3. Species: Match Existing Veneer
  - 4. Cut: Match Existinga. For transparent finish; CS-171, Type II.
  - Match between Veneer Leaves: Match Existing.
     a. Grade 'A'.
  - 6. Assembly of Veneer Leaves on Door Faces: Match Existing.
  - 7. Construction: Extra-Heavy Duty Construction, SCLC-5 Bonded (5-ply, with no added urea-formaldehyde glues).
- C. Edges
  - 1. Wood edge, compatible species as face veneer.
    - a. Manufacturers standard construction with hardwood outer.
- D. Core: Structural Composite Lumber Core consisting of an engineered wood product that is made by fusing a network of wood strands together with a water-resistant adhesive to produce a strong, solid and stable product that has true structural properties with excellent screw holding properties and very high split resistance.
  - 1. Core Edge Interface: Vertical and horizontal edges of solid core doors must be securely bonded to the core with waterproof glue containing no added urea formaldehyde resin.
- E. Fire-Rated Solid Core Doors
  - 1. Faces and WDMA Grade: Provide species and grade to match non-rated doors in same area of building, unless otherwise indicated.
  - 2. Core Construction
    - a. 20 Min. Doors: <u>Single Leaf</u> Same Structural Composite Lumber Core as noted above.
  - 3. Edge Construction
    - a. 20 Min. Doors: <u>Single Leaf</u> Same Structural Composite Lumber with wood edge, compatible species as face veneer.
    - b. All "Category A" doors shall have concealed intumescent seals.

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## F. Glazing of Wood Doors:

- 1. Glazing shall be by the wood door manufacturer.
- 2. Glass shall be in accordance with requirements of Section 08800.

## 2.3 LITE FRAMES

- A. Metal Lite Frames:
  - 1. Standard Metal Vision Frames:
    - a. Basis of Design: Model "LoPro<sup>TM</sup>" as manufactured by Anemostat Door Products.
      - 1) Equivalent by National Guard Products, Inc.
      - 2) or approved equal.
    - b. Material: 20 ga. (1mm) Cold Rolled Steel.
    - c. Finish: Grey Primer, Beige or Bronze Baked Enamel.
    - d. Glazing Thickness: Should be 1/4" (6mm), 3/16" (5mm) or 5/16" (8mm) fire and/or safety rated with UL and/or W.H.I classification markings. Nominal glazing space of 3/8" (10mm) allows for glazing tape to be used on both sides of the glass.
    - e. Fire Ratings with UL & W.H.I Classification markings:
      - 1) 20\* Minute: Approved listing at 3204 sq.in. visible lite, max. width 36", max. height 89".

<u>Note</u>: \*Must be used with fire glazing tape as indicated in Section 08800. Glazing combination must be used in appropriately tested door assembly.

## 2.4 GENERAL FABRICATION REQUIREMENTS

- A. Fabricate wood doors to produce doors complying with following requirements.
- B. In sizes indicated for job-site fitting.
- C. Factory-prefit and premachine doors to fit frame opening sizes indicated with the following uniform clearances and bevels:
  - 1. Comply with tolerance requirements of WDMA for prefitting. Comply with final hardware schedules and door frame shop drawings and with hardware templates.
  - 2. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory premachining.
  - 3. Pre-fit and pre-machine wood doors at factory. Machining shall be in accordance with necessary templates supplied by the Builders Hardware supplier, in accordance with the approved Finish Hardware Schedule for this project. Each door shall be machined for all necessary mortise hardware (ie, locks, hinges, closers, etc.) but face or thru bolt holes shall be done in the field, if such machining is not called for on templates, or is not normally machined at factory. No field preparation will be allowed.
  - 4. Sizing of single doors to be undersized for nominal 1/4 inch, with edges beveled on two edges, as required by the frame manufacturer. Pairs of doors will be undersized 3/16 inch to permit no more than 1/8 inch gap between door leaves. Beveling same as single doors. Door edges beveled 1/8 inch in 2 inch thickness of door.

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- 5. Door clearances are to be 1/8 inch at top and the bottom shall be a maximum of 1/2 inch, or as required by job condition or labeling requirements.
- D. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of doors required.
- E. Factory Finish and Uniform Range of Veneers
  - 1. Prefinish wood doors at factory only.
  - 2. All face veneer shall have uniform range of colors, as specified by Architect, in selection of the range of color of the veneer.
  - 3. Comply with recommendations of WDMA for factory finishing of doors, including final sanding, immediately before application of finishing materials.
  - 4. Provide finish WDMA, TR-8, transparent water-based stain and ultraviolet (UV) cured water based polyurethane sealer and topcoat material, color as selected by Architect.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Install doors using finish hardware in accordance with approved hardware schedule. Protect doors from damage until completion of Project. Except where through bolting is required to meet Code for "A" or "B" label doors, install surface applied hardware on metal or wood doors using all thread screws inserted in pilot drilled holes filled with white acrylic glue.
- B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's printed instructions and of referenced WDMA standard and indicated in the printed instructions provided by the manufacturer.
- C. Install fire-rated doors in corresponding fire-rated frames in accordance with requirements of NFPA No. 80.
- D. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors.
  - 1. Machine doors for hardware. Seal cut surfaces after fitting and machining.
- E. Fitting Clearances for Non-Rated Doors: Provide 1/8" at jambs and heads; 1/16" per leaf at meeting stiles for pairs of doors; and 1/8" from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4" clearance from bottom of door to top of threshold.
- F. Fitting Clearances for Fire-Rated Doors: Comply with NFPA 80.
  - 1. Bevel non-rated doors 1/8" in 2" at lock and hinge edges.
  - 2. Bevel fire-rated doors 1/8" in 2" in lock edge; trim stiles and rails only to extent permitted by labeling agency.

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- 3. Prefit Doors: Fit to frames for uniform clearance at each edge.
- G. Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at the job site.
- H. Manufacturer of wood doors shall install glass in wood doors.

## 3.2 ADJUSTING AND PROTECTION

- A. Operation: Rehang or replace doors which do not swing or operate freely.
- B. Finished Doors: Refinish or replace doors damaged during installation.
  - 1. Protect doors, as recommended by door manufacturer, to ensure that wood doors will be without damage or deterioration at time of Substantial Completion.

# END OF SECTION 08211

## SECTION 08305 - ACCESS 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. Wall access doors.
  - 2. Fire-rated wall access doors.
- B. Types of construction in which access doors are installed include:
  - 1. Masonry.
  - 2. Gypsum board.
  - 3. Tile.
- C. Exact locations and sizes of access doors may not be indicated on the drawings. Obtain specific locations and sizes for access doors from trades requiring access to concealed equipment.
- D. Products Furnished and Installed under This Section:
  - 1. Installation of anchors for access doors placed in masonry: Division 4.
- E. Related Sections:
  - 1. Section 04200 Unit Masonry.
  - 2. Section 09250 Gypsum Drywall.
  - 3. Section 09300 Tile.
  - 4. Section 09900 Painting of access doors.
  - 5. General requirements for access doors: Mechanical Work.
  - 6. General requirements for access doors: Electrical Work.

## 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions and directions for installation of anchorage devices.
  - 1. Include complete schedule, including types, general locations, sizes, wall construction details, finishes, latching or locking provisions, and other data pertinent to installation.
- B. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.

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- C. Special Size Access Doors: Use where required or requested; indicate on schedule.
- D. Shop Drawings: Submit shop drawings for fabrication and installation of customized access doors and frames, including details of each frame type, elevations of door design types, anchorage and accessory items.
- E. Samples: 3" x 5" minimum size, of each panel face material showing factory-finished color and texture.

# 1.4 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: Wherever a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in Underwriters Laboratories, Inc.; "Building Materials Directory" for rating shown.
  - 1. Attach UL Label on each fire-rated access door.
- B. Test Reports: Submit manufacturer's test reports which demonstrate that products comply with required fire ratings.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units which are different than actual opening size necessary for access.
- D. Coordination: Furnish inserts and anchoring devices which must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

## 1.5 WARRANTY

A. Manufacturer's standard **five (5) year** warranty against defects in material and workmanship from date of purchase

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering access doors which may be incorporated in the work include, but are not limited to, the following:
  - 1. Bilco Company.
  - 2. J. L. Industries.
  - 3. Milcor/Lima Register.
  - 4. Bar-Co., Inc.
  - 5. Or approved equal.

## 2.2 MANUFACTURED UNITS

- A. Access Door Assembly 2:
  - 1. Location: Wall.
  - 2. Type: Flush door panel with exposed frame.

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- 3. Substrate: Masonry.
- 4. Fire rating: 1 HR.
- 5. Frame: 16 gauge steel.
- 6. Door: 20 gauge steel flush panel.
- 7. Hinge: Continuous type hinge with stainless steel pin.
- 8. Locking device: Keyed cylinder lock.
- 9. Finish: Baked-on rust-inhibitive prime coat.
- B. Access Door Assembly 3:
  - 1. Location: Wall.
  - 2. Type: Flush door panel with exposed frame.
  - 3. Substrate: Masonry.
  - 4. Frame: 16 gauge steel.
  - 5. Doors: 14 gauge steel flush panel.
  - 6. Hinge: Continuous type hinge with stainless steel pin.
  - 7. Locking Device: Keyed cylinder lock.
  - 8. Finish: Baked-on rust-inhibitive prime coat.
- C. Access Door Assembly 4:
  - 1. Location: Wall.
  - 2. Type: Flush door panel with concealed frame.
  - 3. Substrate: Gypsum board.
  - 4. Frame: 16 gage steel.
  - 5. Door: 14 gage steel flush panel.
  - 6. Hinge: Double-acting concealed spring hinges allowing door to open a minimum of 165 degrees.
  - 7. Locking device: Keyed cylinder lock.
  - 8. Finish: Baked-on rust-inhibitive prime coat.

# 2.3 ACCESSORIES

- A. Locking Devices:
  - 1. Where locking devices are indicated, provide one lock per access door.
  - 2. Supply four (4) keys with each lock.
  - 3. Key access door locks alike.

## 2.4 MATERIALS AND FABRICATION

- A. General: Furnish each access door assembly manufactured as an integral unit, complete with all parts and ready for installation.
- B. Steel Access Doors and Frames: Fabricate units of continuous welded steel construction, unless otherwise indicated. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of support shown.
- C. Frames: Fabricate from 16 gauge steel.

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- D. Fabricate frame with exposed flange nominal 1" wide around perimeter of frame for units installed in the following construction:
  - 1. Exposed masonry.
  - 2. Drywall finish.
  - 3. Ceramic tile finish.
- E. For gypsum drywall, furnish perforated frames with drywall bead.
- F. For installation in masonry construction, furnish frames with adjustable metal masonry anchors.
- G. Flush Panel Doors: Fabricate from not less than 14 gauge sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees. Finish with manufacturer's factory-applied prime paint.
- H. Flush Panel Doors: Fabricate from not less than 14 gauge stainless steel sheet, with concealed spring hinges or concealed piano hinge set to open 175 degrees. Buff exposed surfaces to #4 satin finish.
- I. For fire-rated units, provide manufacturer's standard insulated flush panel/doors, with continuous piano hinge and self-closing mechanism.
- J. Recessed Panel Doors: Fabricate from not less than 18 gauge sheet steel with face of panel formed to provide recess below surface of applied finish. Reinforce panel as required to prevent buckling. Finish with manufacturer's factory-applied prime paint.
- K. Furnish recessed panels and frames with expanded metal lath for concealed installation in plaster.
- L. Locking Devices: Furnish flush, screwdriver-operated cam locks of number required to hold door in flush, smooth plane when closed.
- M. Provide one cylinder lock per access door. Furnish four (4) keys per lock. Key all locks alike, unless otherwise scheduled.
- N. Where shown or scheduled, provide one cylinder lock per access door. Furnish four (4) keys per lock. Key all locks alike, unless otherwise indicated.
- O. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

### PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with manufacturer's instructions for installation of access doors.
- B. Coordinate installation with work of other trades.

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- C. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.
- D. Where the Plumbing, Mechanical, or Electrical (MEP) Subcontractor(s) require an access door to be installed to provide access to valves, etc., the MEP Subcontractor shall provide the access door and the General Contractor shall install the access door.

### 3.2 ADJUST AND CLEAN

- A. Adjust hardware and panels after installation for proper operation.
- B. Remove and replace panels or frames which are warped, bowed or otherwise damaged.

## END OF SECTION 08305

# SECTION 08520 - ALUMINUM WINDOWS

### 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. Extent of each type, grade and performance class of aluminum window units required is indicated on the Drawings.
  - 1. Aluminum window units required are heavy commercial and architectural window grades of the performance class indicated.
- B. Types of aluminum window units required include the following:
  - 1. Aluminum Projected Type Windows.
  - 2. Aluminum Fixed Type Windows.
  - 3. Exterior and interior aluminum trim, closures, angles, etc.
  - 4. All hardware and weatherstripping for windows.
  - 5. Anchors, supports, weeps, brackets and similar elements.
  - 6. All metal to metal sealants.
  - 7. Metal Screens.
  - 8. Integral blinds.
  - 9. Insulating metal panels.
- C. Work of this section shall include field verification of existing dimensions, conditions and installation of windows.
- D. Related Sections:
  - 1. Section 04200 Unit Masonry.
  - 2. Section 07900 Joint Sealer Assemblies.
  - 3. Section 08800 Glass and Glazing.

### 1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Comply with air infiltration, water penetration and structural performance grade class designations according to AAMA/WDMA/CSA 101/I.S.2/A440-08 for the type, grade and performance class of window units required.
- B. Testing Requirements: Meet or exceed performance requirements for specified window classification as described in AAMA/WDMA/CSA 101/I.S.2/A440-08 and at the following minimum test sizes and without the use of any applied parts intended to enhance performance (Tests performed at smaller sizes than listed below shall not be acceptable):

1.	Fixed:	5'0" x 8'3"
2.	Projected:	5'0" x 12'0" (Configuration "C")

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- C. Uniform Structural Performance: For uniform load structural test, is equivalent to 150 percent of the design pressure. Provide window units which have been tested in accordance with ASTM E330 and pass AAMA/WDMA/CSA 101/I.S.2/A440-08, with no failure or permanent deflection for a positive (inward) and negative (outward) test pressure as follows:
  - 1. Fixed: 225 lbs./sq.ft.
  - 2. Projected: 90 lbs./sq.ft.
- D. Uniform Load Deflection: No more than L/175 when tested per ASTM E 330-90 and pass AAMA/WDMA/CSA 101/I.S.2/A440-08 at:
  - 1. Fixed: 150 lbs./sq.ft.
  - 2. Projected: 60 lbs./sq.ft.
- E. Air Infiltration: Provide units with an air infiltration rate and inward test pressure indicated when tested in accordance with ASTM E283:
  - 1. Air infiltration not more than 0.30 cfm / ft. of perimeter crack length with unit closed and locked. Test unit at a static air pressure difference of 6.24 lb./sq.ft.
- F Water Penetration: Provide window units which have been tested in accordance with ASTM E331/ASTM E547 at a static air pressure difference of 12 lbs./sq.ft. With ventilator closed and locked.
  - 1. There shall be no uncontrolled water leakage.
- G. Condensation Resistance: Provide window units which have been tested in accordance with AAMA 1503-1-88 at the prescribed test size and shall meet or exceed the following requirements:
  - 1. CRF factor shall be a minimum of 50 for all window types.
  - 2. Conductive Thermal Transmittance (U-Value) shall not be more than the following at 15 mph. Perpendicular dynamic wind.
    - a. Fixed: .55 Btu/sq.ft.x h x deg F.
    - b. Projected: .55 Btu/sq.ft.x h x deg F.

# 1.4 SUBMITTALS

- A. Shop Drawings: Submit shop drawings for each type of window including information not fully detailed in the manufacturer's standard product data and the following:
  - 1. Submit four copies of shop drawings for the assembly and erection of the window system, an the following:
    - a. Mullion details, including reinforcement and stiffeners.
    - b. Joinery details.
    - c. Weather-stripping details.
    - d. Thermal-break details.
    - e. Glazing details.
  - 2. Indicate clearly on all shop drawings any deviations from the Contract Drawings.

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- 3. Include wall elevations at 1/4" scale, typical unit elevations at 1" scale and full size detail sections of every typical composite member.
- 4. Show anchors, elements not included in manufacturer's standard data, including glazing details.
- 5. It is understood that the dimensions of all materials shall be the Contractor's responsibility. Neither the Owner nor any representative thereof will be in any way responsible for the sizes shown nor will any such sizes be approved before production.
- 6. The materials shown are expected to fit the job conditions, and the Contractor shall be fully responsible.
- B. Product Data: Submit manufacturer's product Specifications, technical product data, recommendations and standard details for each type of aluminum window unit required.
  - 1. Test Reports indicating compliance with ANSI/AAMA performance and thermal test requirements for type, grade and glazing requirements listed in Specifications.
- C. Samples: Submit samples of the specified finish on 12" lengths of window members to the Architect for their approval. Such sample window shall be submitted within ten (10) days of the Architect's request.
  - 1. The Architect reserves the right to require additional samples, which show fabrication techniques and workmanship, and design of hardware and accessories.
- D. Certification: Provide certification by the manufacturer showing that each type, grade and size of window unit complies with requirements where the manufacturer's standard window units have been tested in accordance with specified tests and meet performance requirements specified.
  - 1. Where such testing has not been accomplished, perform required tests through a recognized testing laboratory or agency and provide certified test results.
  - 2. Certificates of Conformance: Submit written certification forms signed and notarized by authorized representatives of the Contractor / Installer / Manufacturer of the window system attesting that:
    - a. The referenced window systems have been furnished, inspected, and installed for this project in complete conformance with requirements of the Bid Documents,
    - b. The referenced window systems, covered under the work of this Contract, meet or exceed the requirements of the "Basis of Design", Project Specification requirements, without any reduction in the quality and performance
- E. Maintenance Data: For operable window sash, operating hardware and finishes to include in maintenance manuals.
- F. Warranty:
  - 1. Window: **Ten (10) years** from date of Substantial Completion.

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- 2. Painted Metal Finishes:
  - a. **Ten (10) years** from date of Substantial Completion for AAMA 2604 High Performance Finishes.

# 1.5 QUALITY ASSURANCE

- A. Standards: Requirements for aluminum windows, terminology and standards of performance, and fabrication workmanship are those specified and recommended in AAMA/WDMA/CSA 101/I.S.2/A440-08 and applicable general recommendation published by AAMA.
- B. Single Source Responsibility: Provide aluminum windows produced by a single manufacturer capable of showing prior production of units similar to those required. The firm engaged must be able to show successful experience in window work including a recommended ten years experience in the fabrication and erection of systems of scope and type similar to the required work.
- C. For the actual fabrication and installation of the windows, use only mechanics who are thoroughly trained and experienced in the skills required and who are completely familiar with the manufacturer's recommended methods of installation plus the requirements of this work.
- D. Engineering: Provide all materials fully processed, prefitted, prepunched, etc. and assure that the unit, when assembled, shall fit the openings so as not to require a cutting, ripping, or fitting on job site by the installing crews.
- E. Preinstallation Conference: If requested, conduct conference at project site to 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, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components.
  - 3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
  - 4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.
- F. Warranty:
  - 1. Window: **Ten (10) years** from date of Substantial Completion.
  - 2. Painted Metal Finishes:
    - a. **Ten (10) years** from date of Substantial Completion for AAMA 2604 High Performance Finishes.

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### 1.6 **PRODUCT HANDLING**

- A. Use all means necessary to protect the materials of this section before, during and after installation and to protect the installed work and materials of all other trades.
- B. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

# 1.7 STANDARDS

- A. Comply with the applicable standards and recommendations published by NAAMM, AAMA and AA, including definitions of terms and designations not otherwise defined herein. For aluminum windows, comply with specifications and recommendations in ANSI A 302.9, unless more stringent requirements are listed in the following specifications.
- B. All tests referred to in these specifications shall be conducted by the recognized independent testing laboratory as approved by Architectural Aluminum Manufacturers Association.
  - 1. All tests must meet or exceed the values as set by the Architectural Aluminum Manufacturers Association, or contained herein, whichever standard is higher.

# PART 2 – PRODUCTS

# 2.1 MANUFACTURERS

A. Basis of Design: Provide windows as manufactured by Architectural Window Manufacturing Corporation; or approved equal as follows:

1.	Fixed:	Series 3000i (F-AW100)	[3-1/2"]
2.	Projected:	Series 3000i (AP-AW100)	[3-1/2"]

- B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.
  - 1. The use of one manufacturer's catalog numbers, and the specific requirements set forth in drawings and specifications, are not intended to preclude the use of other products by other manufacturer's or which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.
- C. Comparable products of the following manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements, intended performances and all other design attributes listed above and provided that deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances as judged solely by the Architect/Owner:
  - 1. EFCO Corporation.
  - 2. Oldcastle BuildingEnvelope® (OBE) Co.
  - 3. Or approved equal.

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# 2.2 MATERIALS

- A. Frame Depths: All windows shall have minimum frame depth as shown on drawings and in accordance with Basis of Design window units indicated in Paragraph 2.1 above.
- B. Aluminum Extrusions: Provide alloy and temper recommended by the window manufacturer for the strength, corrosion-resistance, and application of required finish, but not less than 22,000 psi (150-Mpa) ultimate tensile strength, a yield of 16,000 psi (110-Mpa) in compliance with ASTM B 221, and not less than 0.080" thickness at any location for main frame and sash members, and not less than .0125" for aluminum frame sills (except projected windows which shall be .125" for all frame and sash members).
- C. Fasteners: Provide aluminum, non-magnetic stainless steel, epoxy adhesive, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors and other components of window units.
  - 1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or non-magnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.
  - 2. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match the finish of the member or hardware being fastened, as appropriate.
- D. Anchors, Clips and Window Accessories: Fabricate anchors, clips and window accessories of aluminum, non-magnetic stainless steel or hot-dip zinc coated steel or iron complying with the requirements of ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- E. Compression Type Glazing Strips and Weatherstripping: Unless otherwise indicated, and at the manufacturer's option, provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets complying with AAMA/WDMA/CSA 101/I.S.2/A440-17.
- F. Sealant: For sealants required within fabricated window units, provide type recommended by the manufacturer for joint size and movement. Sealant shall remain permanently elastic, non-shrinking, and non-migrating. Comply with Division-7 "Joint Sealants" section of these specifications for selection and installation of sealants.
- G. Insect Screens: Provide insect screen units for each operable exterior sash or vent. Provide half screens for horizontal sliding window units only.
  - 1. Fabricate screen frames of extruded standard aluminum alloy tubular-shaped members of 0.050" minimum wall thickness complying with SMA 1004, with mitered or coped joints or corner extrusions and concealed mechanical fasteners. Provide removable PVC spline/anchor concealing the edge of the screen frame. Finish frames to match window units, unless otherwise indicated.
  - 2. Wire Fabric Insect Screen:
    - a. Aluminum Wire Fabric: Provide 18-by-16 (1.1-by-1.3-mm) mesh of 0.011-inch-(0.28-mm-) diameter, coated aluminum wire. Color of aluminum wire to match

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aluminum framing (Natural Bright, Charcoal Gray, Black).

- H. Blinds: Provide manufacturer's standard tilt control type with miniature removable key operator, (#5144 set screwless), and shall be in finish and color as selected by the Architect from manufacturer's available finishes and colors.
  - 1. Windows shall be dual glazed with 5/8" integral blinds provided between glazing surfaces. Glazing composition shall be as indicated in Section 08800.
  - 2. Sash depth shall be a minimum of 2" and allow for a minimum air space of 7/8" between the glazing surfaces. All exterior glazing shall be bead glazed.
  - 3. All secondary (interior) glazing shall be marine glazed.

# 2.3 WINDOW GRADES AND PERFORMANCE CLASSIFICATION

A. Architectural Windows: Provide window units complying with requirements of AAMA Grade and Performance Class indicated for each window type, as indicated in Paragraph 2.1 above.

## 2.4 WINDOW TYPES

- A. General: The following paragraphs define the operating arrangement for the types of sash required in window units and specify minimum provisions for each type. Unless otherwise noted, the drawings indicate which panels of each window unit are operable sash and which are fixed.
  - 1. Where 2 or more types of operating sash are included in the same window unit, the operation of each is indicated, and the unit is considered a "Combination Aluminum Window."
- B. Fixed windows are window units containing at least one fixed lite of glass in a weathering frame.
- C. Projected windows are window units containing at least one sash hinged at the top or bottom which project outward or inward from the plane of the window, with or without fixed lites of glass.
- D. Forced-Entry Resistance: Comply with Performance Grade 10 requirements when tested according to ASTM F 588.
- E. Life-Cycle Testing: Test according to AAMA 910 and comply with AAMA/WDMA/CSA 101/I.S.2/A440-08.
- F. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA/CSA 101/I.S.2/A440-08 for operating window types indicated.

### 2.5 HARDWARE

A. General: Except to the extent that more specific or stringent requirements are indicated, provide the manufacturer's standard hardware fabricated from aluminum, stainless steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum

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and of sufficient strength to perform the function for which it is intended. Do not use aluminum in frictional contact with other metals.

- B. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
- C. Window Types:
  - 1. Fixed Windows: Not Applicable.
  - 2. Projected Windows: One white bronze cam operated lock (two over 42" vent width); Windows with locking hardware greater than 72" above finished floor shall utilize a pole operated white bronze spring catch in lieu of the cam lock;4-bar stainless steel hinges with integral limit stop.

# 2.6 ACCESSORIES

- A. General: Except to the extent that more specific or stringent requirements are indicated, provide the manufacturer's standard accessories that comply with indicated standards.
- B. Weatherstripping: Provide sliding-type weatherstripping at locations where sash rails slide horizontally or vertically along the unit frame. Unless otherwise indicated, provide double compression-type weatherstripping at the perimeter of each operating sash where sliding-type weatherstripping is not appropriate.
  - 1. Provide weatherstripping locked-in to extruded grooves in the sash.
- C. Poles: Provide one extruded aluminum window pole and hanger at every room receiving new windows with pole-operated hardware.
- D. Glazing Stops: Aluminum to match windows, screwed or snapped on.
- E. Window Sills: New aluminum window sills shall be minimum 0.125" extruded aluminum profile as indicated on drawings or as selected by the Architect from manufacturer's available profiles to suit existing conditions. Drip leg shall lap down over masonry and upper leg shall project up behind window frame leg for watertight assembly without the need for caulk or sealant. Window sills shall be one piece and continuous without piecing. With Architects approval extensive lengths will be allowed to have joints accomplished with under sill splice minimum of 4" with same profile as sill with all required sealants to achieve watertight seal. No over top sill splices will be allowed.

# 2.7 INSULATING PANELS:

- A. Provide "OMEGA-LITE"; Architectural Windows; Cap Industries, Inc., or approved equal.
  - 1. Overall Thickness: 1"
  - 2. Exterior Face: 0.032 aluminum Kynar finish, Smooth or pebble like surface as selected by the Architect from manufacturer's available full range of available types..
    - a. Color: As selected by the Architect from manufacturer's available full range of colors.

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- 3. Interior Face: Smooth aluminum primed painted: As selected by the Architect from Off White or Colonial White.
- 4. Substrates: 5 mm corrugated polyallomer.
- 5. Core: Polystyrene 2.5 lbs density

# 2.8 FABRICATION

- A. General: Except to the extent that more specific or stringent requirements are indicated, provide manufacturer's standard fabrication that complies with indicated standards and that produces units that are reglazable without dismantling sash framing. Include a complete system for assembly of components and anchorage of window units, and prepare sash for glazing except where preglazing at the factory is indicated.
- B. Sizes and Profiles: Required sizes for window units and profile requirements are indicated on the drawings. Variable dimensions are indicated along with maximum and minimum dimensions as required to achieve design requirements and coordination with other work.
  - 1. Details shown are based upon standard details by one or more manufacturers. Similar details by other manufacturers will be acceptable, provided they comply with size requirements, minimum/maximum profile requirements, and performance standards as indicated or specified.
- C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed (products with exposed thermal barriers will not be acceptable), 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. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
  - 2. No thermal short circuits shall occur between the exterior and interior.
  - 3. The thermal barrier shall be Ensigner's INSULBAR or approved equal, and consist of two glass reinforced polyamide nylon 6/6 struts mechanically crimped in raceways extruded in the exterior and interior extrusions.
  - 4. Poured and debridged urethane thermal barriers shall not be permitted.
- D. Provide weepholes and internal water passages to conduct infiltrating water to the exterior.
- E. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.
- F. Provide subframes, receptors, with anchors for window units of extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units.

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- G. 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, in the manner indicated.
- H. 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/CSA 101/I.S.2/A440-08.
- I. Glazing: Windows shall be glazed with glazing types and systems as shown on drawings and in accordance with Section 08800.
- J. Insect Screens:
  - 1. Locate screen units on either the inside or outside of the sash.
  - 2. Where possible, design window units and hardware to accommodate screens in a tight-fitting removable arrangement, with a minimum of exposed fasteners and latches.
  - 3. Provide color to match window framing.

## 2.9 FINISHES AND COLORS

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- D. Preparation: Prior to fabrication of doors and frames, prepare the aluminum surfaces for finishing in accordance with the aluminum producer's recommendations and the standards of the finisher or processor. Process all components of each assembly simultaneously to attain complete uniformity of color.
- E. Where indicated provide the following finishes:
  - 1. <u>Interior Finish</u>- Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
    - a. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603.
    - b. Color and Gloss: As selected by Architect from manufacturer's full range.

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- 2. <u>Exterior Finish</u> High-Performance Organic Finish: 2-coat fluoropolymer finish complying with AAMA 2605 and 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.
  - a. Color and Gloss: As selected by Architect from manufacturer's full range.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Inspect openings before beginning installation. Verify that rough or masonry opening is correct and the sill plate is level.
- B. Masonry surfaces shall be visibly dry and free of excess mortar, sand and other construction debris.
- C. Metal surfaces shall be dry, clean, free of grease, oil, dirt, rust and corrosion, and welding slag, without sharp edges or offsets at joints.
- D. Inspect windows furnished by the manufacturer, verify existing dimensions and conditions, and provide all required additional aluminum trim and accessories to complete the installation.

### 3.2 INSTALLATION

- A. Comply with drawings, shop drawings and manufacturer's written instructions and recommendations for installation of window units, hardware, operators, and other components of the work.
- B. Set units plumb, level and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.
- C. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with the requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101-85.
- D. Set sill members and other members in a bed of compound or with joint fillers or gaskets, as shown, to provide weathertight construction. Refer to the "Joint Sealer" sections of Division-7 for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the work.
- E. Compounds, joint fillers and gaskets to be installed after installation of window units are specified as work in another section in Division-7.

### 3.3 ADJUSTING

A. Adjust operating sashes, ventilators, screens, hardware and accessories to provide a tight fit at contact points and at weatherstripping, for smooth operation and a weathertight closure. Lubricate hardware and moving parts.

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# 3.4 CLEANING

- A. Clean aluminum surfaces promptly after installation of windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt and other substances. Lubricate hardware and other moving parts.
- B. Clean glass of pre-glazed units promptly after installation of windows; comply with requirements of the "Glass and Glazing" section for cleaning and maintenance.

# 3.5 **PROTECTION**

A. Initiate and maintain protection and other precautions required through the remainder of the construction period, to ensure that, except for normal weathering, window units will be free of damage or deterioration at the time of substantial completion.

## 3.6 **DEMONSTRATION**

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system.

## END OF SECTION 08520

# SECTION 08800 - GLASS AND GLAZING

### 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.
- B. Related Sections:
  - 1. Section 08211 Wood Doors.
  - 2. Section 08520 Aluminum Windows.

# 1.2 SUMMARY

- A. Extent of glass and glazing work is indicated on Drawings and schedule.
- B. Types of work or locations requiring glass and glazing include, but are not limited to, glass types scheduled herein and on the drawings.
  - 1. Windows.
  - 2. Doors.

# 1.3 QUALITY ASSURANCE

- A. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
- C. Safety Glass: Categories I and II materials complying with testing requirements in CPSC 16CFR1201 and permanently marked with label of:
  - 1. Safety Glazing Certification Council (SGCC).
- D. Single Source Responsibility for Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer or fabricator with a recommended 5 years of successful experience in the production of each kind and condition of glass indicated and composed of primary glass obtained from a single source for each type and class required.
- E. Installer (Glazier): A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program
  - 1. Firm with a recommended 5 years of successful experience in glazing work similar to required work.

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F. All glass shall bear the Label of the manufacturer.

# 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each glazing material and fabricated glass product required, including documentation of compliance with requirements and instructions for handling, storing, installing, cleaning and protecting each type of glass and glazing material, and installation and maintenance instructions.
- B. Before any glass is delivered to the job site, submit sections and details of glass installation at framing members.
- C. Samples: Submit for verification purposes, 12" square samples of each type of glass indicated except for clear single pane units, and 12" long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative of adjoining framing system in color.

# 1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

# 1.6 **PROJECT CONDITIONS**

- A. Examine framing and substrate work to receive glass and glazing materials, and condition under which glass is to be installed. Do not proceed with glazing until unsatisfactory conditions have been corrected.
- B. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.
  - 1. Install liquid sealants at ambient and substrate temperatures above 40°F.

# 1.7 WARRANTY

- A. Manufacturer's Special Warranty on Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass manufacturer agreeing to furnish replacements for those coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
  - 1. Warranty Period: **Ten (10) years** from date of Substantial Completion.
- B. Manufacturer's Limited Warranty on Fire-Rated / Impact Gazing: Written warranty, made out to the Owner and signed by manufacturer, warrants only that the product will be free of manufacturing defects resulting in material obstruction through the glass area and/or edge separation and changes in properties of the interlayer for a period of **five (5) years** from the date of purchase, provided the Products have been properly shipped, stored, handled, installed and maintained.

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1. Limitation of Remedy - Inspection: The remedy for product proved to be defective under the terms of this warranty is limited to shipment of replacement product. With respect to all claims under this warranty, the Manufacturer shall have the right to inspect any and all products alleged to be defective.

### PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include; but are not limited to, the following:
  - 1. Standard Glass Products:
    - a. Pilkington, Libbey-Owens-Ford, (LOF)
    - b. Vitro Architectural Glass (formally PPG Glass)
    - c. Guardian Industries Corp.
    - d. Or approved equal.
  - 2. Fire Rated Glass Assemblies:
    - a. Pyran® Platinum F by Schott Glass Products.
    - b. Or approved equal.

## 2.2 PRIMARY GLASS PRODUCTS

- A. Clear Float Glass: ASTM C 1036, Type I (transparent glass, flat), Class 1 (clear), Quality-Q3 (glazing select).
- B. Heat Treated Float Glass (Tempered Plate Glass): ASTM C 1048; Type I; Quality-Q3; Class I (clear)
  - 1. Provide prime glass of color and type indicated, which has been heat treated to strengthen glass in bending to not less than 4.5 times annealed strength.
- C. Uncoated Tinted Float Glass: Type I (transparent glass, flat), Class 2 (tinted heat absorbing and light reducing), Quality-Q3 (glazing select), and as follows:
  - 1. Manufacturer's standard **gray** tint, with visible light transmittance of 33% and shading coefficient of 0.31 for 1/4" thick glass.
  - 2. Manufacturer's standard <u>clear</u>, with visible light transmittance of 70% and shading coefficient of 0.44 for 1/4" thick glass.
- D. Energy Advantage Low-E Glass: Manufacturer's standard clear color Low-E glass, coated on third surface with light transmittance:
  - 1. Gray Tint: 33% and shading coefficient of .28 for 1/4" thick glass.
  - 2. Clear: 33% and shading coefficient of .44 for 1/4" thick glass.

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## 2.3 DUAL GLAZING

- A. Provide dual glazing for applications in aluminum windows which include integral blinds between panes and as follows:
  - 1. Exterior pane shall 1/4-inch thick gray tinted glass to meet indicated requirements.
  - 2. Interior pane shall be 1/4-inch thick "Low-E" float.
  - 3. Exterior and interior panes shall be tempered where within 6 feet of a door or where "tempered" or "safety" glass is required by Code.

### 2.4 FIRE-RATED / IMPACT GLAZING AND FRAMING ASSEMBLIES

- A. Fire protection rated and impact safety rated glazing material with a thickness (indicated below), made from a patented directional specialty tempered glazing or laminated glass ceramic with a transparent appearance.
  - 1. Units are tested listed and labeled by Underwriters Laboratories Inc., UL, for the following applications and comply with the following Agencies:
    - a. Classified and labeled by Underwriters Laboratories, Inc.®. Test report number for labeled fire-rated assemblies is UL File No. R22036.
    - b. All above tests performed in accordance with UL 9, UL 10B, UL 10C, NFPA 257, NFPA 80, ASTM E2010-01, ASTM E2074-00.
    - c. This product is not considered a barrier to radiant heat and has not met the ASTM E-119 or UL 263 test standards.
    - d. Fire rated for up to 90 minutes with required hose-stream test.
    - e. Fire-rated for up to 180 minutes in doors with required hose-stream test.
    - f. Withstands thermal shock.
  - 3. Impact rating: ANSI Z97.1 (Class A) and CPSC 16CFR1201 (Cat. I and II).
  - 4. Passes positive pressure test standard UL 10C.
  - 5. Laminated floated glass-ceramic.
  - 6. Clear and colorless without the distracting amber tint associated with competitive glass-ceramics. Microfloat process allows for smooth surface and distortion-free mirror finish.
  - 7. Approved for use with any fire-rated frame.
  - 8. Sound Transmission Class (STC): 36
  - 9. The panel must be placed on calcium silicate or hardwood setting blocks and glazed using PYRAN® Platinum classified glazing tape, such as closed cell PVC, Fiberfrax tape or Pemko FG3000S90; or approved equal.
- B. Subject to compliance with requirements, provide fire-rated impact glazing, as follows:
  - 1. FRIG-1: Fire-Rated / Impact Gazing Provide Pyran® Platinum F (filmed) by Schott

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Glass Products; or approved equal.

- a. Doors with fire rating requirements of up to 90 minutes.
  - 1) Doors, Non-Temperature Rise Maximum exposed area of glazing = 3,708 sq. in.
    - a) Maximum: Width = 37-3/4" & Height = 94-1/4".
  - 2) Thickness: 3/16"
  - 3) Provide 5/8" glazing stops.
- b. Doors, Temperature Rise and Non-Temperature Rise of up to 180 minutes.
  - 1) Maximum exposed area of glazing = 100 sq. in.
    - a) Maximum: Width = 12" & Height = 33".
  - 2) Thickness: 3/16"
  - 3) Provide 5/8" glazing stops.
- c. Other than Doors with fire rating requirements of up to 90 minutes.
  - 1) Maximum exposed area of glazing = 4,933 sq. in.
    - a) Maximum: Width = 98-1/4" & Height = 98-1/4".
  - 2) Thickness: 3/16"
  - 3) Provide 5/8" glazing stops.

## 2.5 ELASTOMERIC GLAZING SEALANTS AND PREFORMED GLAZING TAPES

- A. General: Provide color of exposed glazing sealant compound as selected by Architect from manufacturer's standard colors, or black if no color is so selected. Comply with manufacturer's recommendations for selection of hardness, depending upon the location of each application, conditions at time of installation, and performance requirements as indicated. Select materials, and variations or modifications, carefully for compatibility with surfaces contacted in the installation.
- A. 1 Part Silicone Rubber Glazing Sealant: Elastomeric silicone sealant complying with FS TT-D-001543, Class A, non-sag. Provide acid type recommended by manufacturer where only non-porous bond surfaces are contacted; provide non-acid type recommended by manufacturer where one or more porous bond surfaces are contacted.
- B. Butyl Rubber Glazing Tape: Partly-vulcanized, self-adhesive, non-staining, elastomeric butyl rubber tape. 98% solids, intended for 35% compression, no appreciable deterioration for 3000 hour test in Atlas Weatherometer; either plain or pre-shimmed as required for proper installation of glass.

# 2.6 GLAZING COMPOUND FOR FIRE-RATED GLAZING MATERIALS

- A. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.
  - 1. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.
    - a. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

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# 2.7 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
- B Setting Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness.
- C. Spacers: Neoprene, EPDM or silicone blocks, or continuous extrusions, as required for compatibility with glazing sealant, of size, shape and hardness recommended by glass and sealant manufacturers for application indicated.
- C. Edge Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.
- D. Compressible Filler Rods: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5-10 psi compression strength for 25 percent deflection.

## PART 3 - EXECUTION

## 3.1 **EXAMINATION**

A. Require Glazier to inspect work of glass framing erector for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system; for existence of minimum required face or edge clearances; and for effective sealing of joinery. Obtain Glazier's written report listing conditions detrimental to performance of glazing work. Do not allow glazing work to proceed until unsatisfactory conditions have been corrected.

# 3.2 STANDARDS AND PERFORMANCE

- A. Comply with combined printed recommendations of glass manufacturers, of manufacturers of sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing standards.
- B. Glazing channel dimensions as indicated in details are intended to provide for necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by job conditions at time of installation.
- C. Protect glass from edge damage during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

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- E. Inspect each piece of glass immediately before installation, and discard pieces which have significant edge damage or face imperfections.
- F. Unify appearance of each series of lites by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other piece.

## 3.3 PREPARATION FOR GLAZING

- A. Clean glazing channel and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrate. Remove lacquer from metal surfaces where elastomeric sealants are used.
- B. Apply primer or sealer to joint surfaces where recommended by sealant manufacturer.

# 3.4 GLAZING

- A. Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but with edge nearest corner not closer than 6" from corner, unless otherwise required. Set blocks in thin course of sealant which is acceptable for heel bead use.
- B. Provide spacers inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50 united inches (length plus height), except where gaskets or glazing tapes with continuous spacer rods are used for glazing. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.
- C. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.
- D. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.
- E. Provide compressible filler rods or equivalent back-up material, as recommended by sealant and glass manufacturers, to prevent sealant from extruding into glass channel weep systems and from adhering to joints back surface as well as to control depth of sealant for optimum performance, unless otherwise indicated.
- F. Force sealants into glazing channels to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.
- G. Tool exposed surfaces of sealants to provide a substantial "wash" away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel, so as to eliminate dirt and moisture pockets.
- H. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when installation is subjected to movement.
- I. Miter cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent pull away at corners; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

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### 3.5 **PROTECTION AND CLEANING**

- A. Cure glazing sealants and compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.
- B. Protect glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.
- C. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.
- D. Maintain glass in a reasonably clean condition during construction, so that it will not be damaged by corrosive action and will not contribute (by wash-off) to deterioration of glazing materials and other work. Comply with manufacturer's instructions.
- E. Wash and polish glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Comply with glass manufacturer's recommendations for final cleaning.

### **END OF SECTION 08800**

## SECTION 09250 - GYPSUM DRYWALL

### 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. Extent of each type of gypsum drywall construction required is indicated on the drawings.
- B. This Section includes the following types of gypsum board construction:
  - 1. Gypsum drywall including screw-type metal support system
  - 2. Gypsum backing board
  - 3. Impact resistance gypsum wallboard
  - 4. Water-resistant / impact resistance gypsum wallboard
  - 5. Sound Insulation
  - 6. Drywall finishing (joint tape and compound treatment)
  - 7. Vinyl trim and accessories.
- C. Related Sections:
  - 1. Section 09300 Tile
  - 2. Section 09900 Painting

# 1.3 QUALITY ASSURANCE

- A. Manufacturer: Obtain gypsum board products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards.
- B. Single Source Responsibility: Obtain each type of gypsum board and related joint treatment materials from a single manufacturer.
- C. Fireblocking and Draftstopping: Comply with the International Building Code requirements for installation of fireblocking and / or draftstopping, to prevent the fire passage of flame and product of combustion through concealed spaces or openings in gypsum board systems, in the event of fire.
- D. Provide self extinguishing vinyl trim accessories which do not support combustion once flame source is removed.

# 1.4 **REFERENCES**

- A. ANSI/ASTM C 840 Gypsum Board Standard Comply with applicable requirements for application and finishing of gypsum board, unless otherwise indicated.
- B. ASTM C1396/C1396M Gypsum Wallboard (Standard, Type X, Flexible, Ceiling, Foil-Backed, Mold-Resistant)

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C.	ASTM C754	Steel Framing Standard - Comply with applicable requirements for installation of steel framing for gypsum board)
D.	ASTM C11	Gypsum and Related Building Materials and Systems
E.	ASTM C1396/C1	396M Impact Resistance Gypsum Wallboard and tested in accordance with ASTM C1629/C1629M
F.	ASTM D1784	Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPCV) Compounds
G.	ASTM C475/C47	5M Joint Treatment Materials
H.	ASTM D3678	Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Interior- Profile Extrusions
I.	ASTM C1047	Interior Trim

J. Application and Finishing of Gypsum Panel Products: GA-216

# 1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's product Specifications and installation instructions for each gypsum drywall component, including other data as may be required to show compliance with these Specifications.
  - 1. Provide product data for impact resistance gypsum wallboard system.
- B. Shop drawings: Submit shop drawings for wall metal stud framing for structural heavy gauge wall studs supporting other equipment, items, cabinets, etc.
  - 1. Show layout, spacings, sizes, thicknesses, and types of metal framing, fabrication, fastening and anchorage details, including mechanical fasteners.
  - 2. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachments to other units of Work.
  - 3. Indicate manufacturer's design thickness to meet structural performance requirements for each wall mounted item, equipment, cabinet, etc.
- C. Samples: For the following products:
  - 1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

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- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.
- C. Handle gypsum boards to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

### 1.7 **PROJECT CONDITIONS**

- A. Environmental Conditions, General: Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.
  - 1. Minimum Room Temperatures: When ambient outdoor temperatures are below 55°F maintain continuous, comfortable building working temperature of not less than 55°F for 48 hours prior to application and continuously thereafter until drying is complete.
  - 2. Ventilate building spaces as required to remove water in excess of that required for drying joint treatment material immediately after its application. Avoid drafts during dry, hot weather to prevent materials form drying too rapidly.
  - 3. The gypsum drywall shall be installed only when the storefront system / windows have been installed and the roof repairs are installed and in watertight condition to prevent the growth of mold. The Contractor shall not install gypsum drywall panels that are wet, have the indication of mold, including but not limited to: fuzzy or splotchy surface contamination and discoloration.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:
- B. Metal Support Systems:
  - 1. Allied Structural Industries
  - 2. Clark-Dietrich Building Systems
  - 3. National Gypsum Company
  - 4. Marino\WARE; a Div. of WARE Industries, Inc.
  - 5. United States Gypsum Co. (USG)
  - 6. Or approved equal.
- C. Gypsum Boards and Related Products:
  - 1. CertainTeed Gypsum.
  - 2. Georgia-Pacific Corp.
  - 3. Gold Bond Building Products Div., National Gypsum Co.
  - 4. United States Gypsum Co.
  - 5. Continental Building Products
  - 6. Or approved equal.

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- D. Impact Resistance Gypsum Wallboard:
  - 1. United States Gypsum Co. (USG)
  - 2. National Gypsum Co.
  - 3. Georgia-Pacific Gypsum, LLC
  - 4. Continental Building Products
  - 5. CertainTeed Gypsum.
  - 6. Or approved equal.

### E. Vinyl Trim

- 1. Trim-Tex,
- 2. Or approved equal.

## 2.2 METAL SUPPORT MATERIALS

- A. General: Provide components which comply with ASTM C754 for materials and sizes, unless otherwise indicated.
- B. Ceiling Support Materials and Systems
  - 1. General: Size ceiling support components to comply with ASTM C754 unless otherwise indicated.
  - 2. Main Runners: Steel channels with rust inhibitive paint finish, hot or cold-rolled.
  - 3. Hanger Wire: ASTM CA641, soft, Class 1 galvanized.
  - 4. Hanger Anchorage Devices: Devices applicable to the indicated method of structural anchorage for ceiling hangers and whose suitability for use intended has been proven through standard construction practices or by certified test data. Size devices for 3x calculated load supported.
  - 5. Furring Member: ASTM C645; 0.0179" minimum thickness of base metal, hat-shaped.
  - 6. Furring Anchorages: 16 gauge galvanized wire ties, manufacturer's standard wire type clips, bolts, nails or screws as recommended by furring manufacturer and complying with C754.
  - 7. Direct Suspension Systems: Manufacturer's standard zinc coated or painted steel system of furring runners, furring tees, and accessories designed for concealed support of gypsum drywall ceilings, of proper type for use intended.
- C. Wall/Partition Support Materials
  - 1. Studs ASTM C645, 25 gauge unless otherwise indicated. 20 gauge minimum at door jambs and wherever structural or other gauge studs are called for, for use with impact resistant type gypsum wallboard, and to comply with applicable published instructions and recommendations of gypsum board manufacturer or, if not available, of "Gypsum Construction Handbook" published by United States Gypsum Company.
    - a. Depth of Section: 3-5/8 inch, unless indicated otherwise.

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- b. Runners: Match studs; type recommended by stud manufacturer for floor and ceiling support of studs, and for vertical abutment of drywall work at other work.
- c. Provide structural heavy gauge studs and bracing to support loads of wall mounted items, equipment, cabinets, etc. coordinate with other trades for weight requirements and mounting locations.
- 2. Hemmed Leg Furring Channel Members: ASTM C645, 25 gauge hat-shaped.
- 3. Fasteners for Stud Members: Provide fasteners of type, material, size, recommended by furring manufacturer for the substrate and application indicated.

### 2.3 GYPSUM BOARD

- A. General: ASTM C1396, in maximum lengths available to minimize end to end joints.
  - 1. Type: Regular, unless otherwise indicated.
  - 2. Edges: Tapered.
  - 3. Thickness: 5/8 inch, unless otherwise indicated.
- B. Water-Resistant Gypsum Board and Tile Backer: ASTM C1178, and as follows:
  - 1. Thickness: 5/8 inch, unless otherwise indicated.
  - 2. Provide at showers, toilet rooms and where indicated.
  - 3. Basis of Design: "Dens-Shield Tile Backer"; Georgia-Pacific Corp.; or approved equal.
    - a. Provide manufacturer's standard **20-year warranty** which starts at approved date of substantial completion.
    - b. Provide manufacturer's recommended accessories and joint finishing materials.
    - c. Subject to compliance with requirements of the Contract Documents, manufacturers offering products which may be incorporated in work include the following:
      - 1) "Exp Tile Backer", by National Gypsum.
      - 2) "Diamondback GlasRoc Gypsum Tile Backer, by CertainTeed Gypsum.
      - 3) "Durock™ Brand Glass-Mat Tile Backerboard", by USG.
      - 4) Or approved equal.
- C. Impact Resistance Gypsum Wallboard: ASTM C1629 level 3 (highest) for hard- and soft-body impact, and tested in accordance with ASTM C473 for moisture and mold resistance and ASTM D3273 for resistance to growth of mold on the surface of interior coatings. Mold Defense per ASTM D3273. Provide Type X; tapered edge, 5/8 inch thick, unless otherwise indicated. (Paintable)
  - 1. Basis of Design: "Mold Tough VHI Firecode Core" High-Impact-Resistant Panels with Moisture and Mold Resistance; United States Gypsum Co.; or approved equal.
  - 2. Where two layers of gypsum wallboard application is indicated, provide impact resistance type gypsum wallboard only for the exposed to view gypsum wallboard layer.

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- 3. Subject to compliance with requirements of the Contract Documents, manufacturers offering products which may be incorporated in work include the following:
  - a. "Hi-Impact XP", by National Gypsum.
  - b. "Extreme Impact Resistant Gypsum Drywall, by CertainTeed Gypsum.
  - c. Or approved equal.
- 4. Use as a tile substrate is limited to tile installed according to the most current TCNA and ANSI specifications. Please consult with the adhesive and tile manufacturers for their recommendations for maximum size and weight parameters for use with gypsum board.
- D. Impact Resistance / Water-Resistant Gypsum Board: ASTM C1178, and as follows: (Paintable)
  - 1. Thickness: 5/8 inch, unless otherwise indicated.
  - 2. Materials shall be mold resistance.
  - 3. Provide at plumbing fixtures, where indicated.
  - 4. Basis of Design: "Fiberock Brand Aqua"; United States Gypsum Co.; or approved equal.

# 2.4 GYPSUM BOARD CEILING SUSPENSION SYSTEM

- A. Heavy-Duty Drywall Furring Tee's: Provide heavy-duty furring system which comply with ASTM C645 and has G40 minimum protective for hot-dipped galvanized process and .0179 steel thickness before application of protective coating.
  - 1. Structural Classification: Comply with ASTM C635 for heavy-duty system.
  - 2. Provide manufacturer's standard suspension system accessories required for each condition indicated on the contract documents.
- B. The following system indicated, is the "Basis of Design", other manufacturer's will be considered for substitution, provided they comply with the contract documents and are submitted as per the requirements of AIA A201 and Section 00800:
  - 1. "Perimeter Solutions"; Armstrong World Industries, Inc.; "Drywall Suspension System"; USG Corp.; or approved equal.
  - 2. Main Beam: Double-web steel construction, hot dipped galvanized, 1-1/2" web height with rectangular top bulb, and prefinished 1-1/2" flange; (Item No. HD8906). For fire rated ceilings provide main beam formed to include integral splice for expansion relief. Web is to be formed to receive override cross tee.
  - 3. Primary Furring Cross Tees: Double-web, hot-dipped galvanized steel, 1-1/2" web height with rectangular bulb and hot-dipped 1-1/2" knurled flange.
  - 4. Secondary Framing Cross Tees: Double-web, hot-dipped galvanized steel, 1-1/2" web height with rectangular bulb and hot-dipped 15/16" flange.

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- 5. Wall Moldings: Manufacturer's standard hot-dipped galvanized steel angles or channels as selected by the Architect.
- 6. Hanger Wire: Hot dipped galvanized steel, 12 gauge, tested to exceed 500 lbs. pull out force.
- 7. Accessories: Manufacturer's standard angle clips, direct ceiling clips, acoustical transition clips and other accessories required to allow for use of complete grid system at indicated transitions for walls and ceilings.

# 2.5 TRIM ACCESSORIES

- A. General: Provide manufacturer's standard trim accessories of types indicated for drywall work, formed of galvanized steel unless otherwise indicated, with either knurled and perforated or expanded flanges for nailing or stapling, and beaded for concealment of flanges in joint compound. Provide corner beads, L-type edge trim beads, J-type edge trim beads, special L-kerf type edge trim beads, and one-piece control joint beads.
- B. Semi-Finishing Type: Manufacturer's standard trim units which are not to be finished with joint compound (non-beaded), where indicated.

# 2.6 JOINT TREATMENT MATERIALS (GYPSUM BOARD APPLICATION)

- A. General: Provide materials complying with ASTM C475, ASTM C840, and recommendations of manufacturer of both gypsum board and joint treatment materials for the application indicated.
- B. Joint Tape: Manufacturer's recommended types for indicated applications. Use types compatible with joint compounds.
- C. Joint Compounds: Provide manufacturer's recommended types for indicated applications.
  - 1. For interior repair and patching work, provide chemical-hardening-type for bedding and filling, ready-mixed vinyl type or vinyl type powder type for topping.

# 2.7 MISCELLANEOUS MATERIALS

- A. General: Provide auxiliary materials for gypsum drywall construction which comply with referenced standards and the recommendations of the manufacturer of the gypsum board.
- B. Gypsum Board Screws: ASTM C954 or ASTM C1002.
- C. Acoustical Sealant: Water base type, non-drying, non-bleeding, non-staining type; permanently elastic, as recommended by gypsum board manufacturer.
  - 1. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant, [with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.

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2. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

# 2.8 SOUND ATTENUATION BLANKETS

A. Products shall be in accordance with ASTM C665-84, Type I semi-rigid unfaced mineral fiber blanket, Class 25 flame spread, thickness as indicated, and/or to achieve a minimum of STC 50 rating for indicated assemblies.

# **PART 3 - EXECUTION**

# 3.1 EXAMINATION

A. Examine substrates to which drywall construction attaches or abuts, preset hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of drywall construction. Do not proceed with installation until unsatisfactory conditions have been corrected.

## 3.2 PREPARATION OF METAL SUPPORT SYSTEMS

- A. Ceiling Anchorages: Coordinate installation of ceiling suspension system with installation of overhead structural systems to ensure that inserts and other structural anchorage provisions have been installed to receive ceiling anchors in a manner that will develop their full strength and at spacing required to support ceiling.
  - 1. Furnish concrete inserts and other devices indicated, to other trades for installation well in advance of time needed for coordination with other construction.

# 3.3 INSTALLATION OF METAL SUPPORT SYSTEMS

- A. Do not bridge building expansion and control joints with steel framing or furring members; independently frame both sides of joints with framing or furring members or as indicated.
- B. Provide furring and shims as required to install new work over existing substrates so that new work will be installed plumb. level and true.
- C. Ceiling Support Suspension Systems
  - 1. Secure hangers to structural support by anchorage devices or fasteners.
  - 2. Space main runners 4'-0" o.c. and space hangers 4'-0" o.c. along runners, except as otherwise shown.
  - 3. Level main runners to a tolerance of 1/4" in 12'-0", measured both lengthwise on each runner and transversely between parallel runners.
  - 4. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

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- 5. Direct-hung Metal Support System: Attach perimeter wall track or angle wherever support system meets vertical surfaces. Mechanically join support members to each other and butt-cut to fit into wall track.
- 6. Space furring member 16" o.c. except as otherwise indicated.
- 7. Install auxiliary framing at termination of drywall work, and at openings for light fixtures and similar work, as required for support of both the drywall construction and other work indicated for support thereon.
- D. Wall-Partition Support Systems:
  - Install supplementary framing, blocking and bracing at terminations in the work and for support of fixtures, equipment services, heavy trim, furnishings, and similar work to comply with details indicated or, if not otherwise indicated, to comply with applicable published recommendations of gypsum board manufacturer or, if not available, of "Gypsum Construction Handbook" published by United States Gypsum Company.
  - 2. Isolate non-load bearing steel stud system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
    - a. Install single deep-leg deflection tracks and anchor to building structure.
    - b. Connect drift clips to cold-formed metal framing and anchor to building structure.
  - 3. Install runners tracks at floors, ceilings and structural walls and columns where gypsum drywall stud system abuts other work, except as otherwise indicated. Ramset to precast plank.
  - 4. Extend partition stud system through acoustical ceilings and elsewhere as indicated to the structural support and substrate above the ceiling.
  - 5. Frame door openings with vertical studs securely attached by screws at each jamb either directly to frames or to jamb anchor clips on door frame; install runner track sections (for jack studs) at head and secure to jamb studs.
  - 6. Space studs 16 inches o.c. except as otherwise indicated.
  - 7. Extend vertical jamb studs through suspended ceilings and attach to underside of floor or roof structure above.
  - 8. Frame openings other than door openings in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.
  - 9. Provide runner tracks of same gauge as jamb studs. Space jack studs same as partition studs.
  - 10. Cut studs 1/2" short of full height to provide perimeter relief.
  - 11. Do not fasten studs to top track to allow independent movement of studs and track.

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- 12. Door jambs:
  - a. Install double 20 gauge studs at each jamb for all doors.
  - b. Space wall furring members 16 inches o.c. except as otherwise indicated.

### 3.4 APPLICATION AND FINISHING OF GYPSUM BOARD, GENERAL

- A. Pre-Installation Conference: Meet at the project site with the installers of related work and review the coordination and sequencing of work to ensure that everything to be concealed by gypsum drywall has been accomplished, and that chases, access panels, openings, supplementary framing and blocking and similar provisions have been completed.
- B. Install sound attenuation blankets at all partitions prior to gypsum board unless readily installed after board has been installed.
- C. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 24 inches in alternate courses of board.
- D. Install ceiling boards across framing in the manner which minimizes the number of end-butt joints, and which avoids end joints in the central area of each ceiling. Stagger end joints at least 24 inches.
- E. Install wall/partition boards in manner which minimizes the number of end-butt joints or avoids them entirely where possible.
- F. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place.
- G. Locate either edge or end joints over supports, except in horizontal applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field-cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.
- H. Attach gypsum board to framing and blocking provided for additional support at openings and cutouts.
- I. Cover both faces of steel stud partition framing with gypsum board in concealed spaces (above ceilings, etc.)
- J. Form control joints and expansion joints at locations indicated (@ 30'-0" o.c. or 900 sf), with space between edges of boards, prepared to receive trim accessories.
- K. Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4 inch to 1/2 inch space and trim edge with "U" bead edge trim. Seal joints with acoustical sealant.
- L. Floating Construction: Where feasible, including where recommended by manufacturer, install gypsum board over wood framing, with "floating" internal corner construction.
- M. Space fasteners in gypsum boards in accordance with referenced gypsum board application and finishing standard and manufacturer's recommendations.

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## 3.5 METHODS OF GYPSUM BOARD APPLICATION

- A. Single-Layer Application: Install gypsum wallboard as follows:
  - 1. On ceilings apply gypsum board prior to wall/partition board application to the greatest extent possible.
  - 2. On partitions/walls apply gypsum board vertically (parallel to framing), unless otherwise indicated, and provide sheet lengths which will minimize end joints.

# 3.6 INSTALLATION OF DRYWALL TRIM ACCESSORIES

- A. General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.
- B. Install corner beads at external corners.
- C. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed, and except where plastic trim is indicated. Provide type with face flange to receive joint compound. Install "L" type trim where drywall construction is tightly abutted to other construction and install special kerfed type where other work is kerfed to receive long leg of "L" type trim. Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).
  - 1. Install J-type semi-finishing trim where indicated, and where exterior gypsum board edges are not covered by applied moldings.
- D. Install metal control joint (beaded type) where indicated or required.

# 3.7 FINISHING OF DRYWALL

- A. General: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim, and control joints; penetrations; fastener heads, surface defects and elsewhere as required to prepare work for decoration.
- B. Prefill open joints and rounded or beveled edges, if any, using setting-type joint compound.
- C. Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.
- D. Apply joint compounds in 3 coats (not including prefill of openings in base), and sand between last 2 coats and after last coat.
- E. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C11, ASTM C 840 and GA-216:
  - 1. <u>Level 1</u>: All joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. In plenum areas above the ceiling, attics, areas concealed in the building (does not typically meet fire-resistant assembly requirements.

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- 2. <u>Level 2</u>: All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be free of excess joint compound. Tool marks and ridges are acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the condition of this level. In garages, warehouse storage areas, and other similar areas where the final surface appearance is not of concern, Level 2 finish is the recommendation. Level 2 may be specified where moisture resistant gypsum board is used as a tile substrate.
- 3. <u>Level 5:</u> All joints and interior angles shall have tape embedded in joint compound and shall be immediately wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Two separate coats of joint compound shall be applied over all flat joints and one separate coat of joint compound shall be applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. A thin skim coat of joint compound trowel applied, or a material manufactured especially for this purpose and applied in accordance with manufacturer's recommendations, applied to the entire surface. The surface shall be free of tool marks and ridges. Finish for areas that are to receive gloss, semi-gloss, enamel or non-textured flat paints.

### 3.8 IMPACT RESISTANCE GYPSUM WALLBOARD INSTALLATION

- A. General: Install fiber reinforced gypsum wallboard according to manufacturer's instructions and GA-216 "Application and Finishing of Gypsum Board."
  - 1. Nails and Screws: Corrosion resistant; ASTM C 840.
  - 2. Adhesives: Manufacturer's approved adhesive types.
  - 3. Accessories: Similar to indicated gypsum wallboard application.
  - 4. Joint Tape, Taping Compound and Finishing Compound: Comply with ASTM C 475.

### 3.9 CLEANING AND PROTECTION

- A. Remove temporary coverings used to protect other work.
- B. Provide final protection and maintain conditions, in a manner suitable to Installer, which ensures gypsum drywall construction being without damage or deterioration at time of Substantial Completion.

# END OF SECTION 09250

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### SECTION 09300 - TILE

### 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 DESCRIPTION OF WORK

- A. Definition: Tile includes ceramic surfacing units made from clay or other ceramic materials.
- B. Extent of tile work is indicated on the drawings and schedules.
- C. Type of tile work in this section includes the following:
  - 1. Glazed wall tile.
  - 2. Porcelain Tile.
  - 3. Marble thresholds.
- D. Related Sections:
  - 1. Section 03300 Concrete Work for preparation new concrete slab work, concrete slab infill work and slab depressions.
  - 2. Section 07900 Joints Sealer Assemblies.

### 1.3 QUALITY ASSURANCE

- A. Tile manufacturing standard: ANSI 137.1. Furnish tile complying with Standard Grade requirements unless indicated otherwise.
- B. Proprietary Materials: Handle, store, mix and apply proprietary setting and grouting materials in compliance with manufacturer's instructions.
- C. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.
- D. Flooring shall comply with ANSI A137.1 American National Standard Specifications for Ceramic Tile, current edition.
- E. Installer Qualifications:
  - 1. Installer employs Ceramic Tile Education Foundation Certified Installers for Project.
  - 2. Installer employs factory trained installers for the Project.
- F. To ensure warranty requirements and compatibility of products; please provide all stone tile grout, setting materials, additives, accessories, and factory-prepared dry-set mortars from the same manufacturer.

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## 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information and installation instructions for materials required, except bulk materials.
- B. Samples for Initial Selection Purposes: Submit manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures and patterns available for each type of tile indicated. Include samples of grout and accessories involving color selection.
- C. Samples for Verification Purposes: Submit the following:
  - 1. Samples for each type of tile and for each color and texture required, not less than 12" square, on plywood or hardboard backing and grouted.
  - 2. Full size samples for each type of trim, accessory and for each color.
  - 3. 6" long samples of stone thresholds.
  - 4. Samples of metal edge strip.
- D. Certification: Furnish Master Grade Certificates for each shipment and type of tile, signed by manufacturer.
- E. Slip-Resistant Tile:
  - 1. ASTM E303, Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester, and has been endorsed by the Ceramic Tile Institute of America (CTIOA) for all types of flooring since 2001.
  - 2. Submit manufacturer's test data for slip-resistant tile. Tests shall be in conformance with indicated applicable codes and regulations.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, freezing, foreign matter or other causes.
- B. Do not use frozen materials unless specifically allowed by manufacturer.
- C. Deliver and store materials on-site at least 24 hours before work begins.
- D. Provide heated and dry storage facilities on-site.

# 1.6 **PROJECT CONDITIONS**

A. Do not begin installation until building is completely enclosed and maintaining temperature and humidity conditions consistent with "after occupancy" conditions for a minimum of 2 weeks.

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### 2:09300-2
- B. Maintain continuous and uniform building temperatures of not less than 10°C (50°F) during installation.
- C. Ventilate spaces receiving tile in accordance with material manufacturer's instructions.

# 1.7 MAINTENANCE MATERIALS

- A. Furnish extra materials that match and are from the same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3% of amount installed for each type, composition, color, pattern and size indicated.
  - 2. Grout: Furnish quantity of grout equal to 3% of amount installed for each type, composition, color indicated.

## 1.8 WARRANTY

- A. Limited Warranty:
  - 1. Manufacturer warrants that manufactured products will be free from defect for a period of **one (1) year** from date of purchase.
    - a. Defect is defined as a shortfall in the product to perform to manufacturer's specifications as disclosed in product literature, within industry allowable tolerances as set forth in standard, national industry protocols.
    - b. Manufacturer provides detailed information in its product literature regarding appropriate tile and stone applications. Failure to comply with recommended applications voids this warranty.
    - c. This one-year express warranty is the sole warranty extended and replaces any statutory warranties to the maximum extent allowable by law.
- B. Epoxy Grout:
  - 1. DS 230.10: **Ten (10) Year** System Warranty.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
  - 1. Manufacturers of Glazed Wall Tile:
    - a. Basis of Design: Dal-Tile Corp.
    - b. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to the following:
      - 1) Crossville, Inc.
      - 2) Summitville Tiles, Inc.
      - 3) Nemo Tile Co.
      - 4) American Olean Tile Co., Inc.
      - 5) Or approved equal.

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### 2:09300-3

\*<u>Note</u>: At bullnose and bullnose corner tiles, the Tile Manufacturer shall ensure the glazed edge of the tile covers all exposed outside surfaces of bullnose tiles. The unglazed chamfered edge of the bullnose edge of the tile <u>is not permitted</u> and will be rejected.

- 2. Manufacturers of Porcelain Tile:
  - a. Basis of Design: Dal-Tile Corp.
  - b. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to the following:
    - 1) Crossville, Inc.
    - 2) Revigres.
    - 3) Or approved equal.

## 2.2 TILE PRODUCTS

- A. Glazed Wall Tile: Provide flat tile complying with the following requirements:
  - 1. Nominal Facial Dimensions: 8" x 24" unless otherwise shown.
  - 2. Nominal Thickness: 3/8".
  - 3. Face: Plain with cushion edge.
  - 4. Colors:
    - a. PT-1: Biscuit, #K175 (1)
    - b. PT-2: Arctic White, #0190 (1)
    - c. PT-3: Ocean Blue, #1049 (3)
- B. Porcelain Tile:
  - 1. Basis of Design: Provide "Volume 1.0", as manufactured by Daltile Corp.; or approved equal, to comply with following:
    - a. Floor Tile: 12" x 24" x 5/16" thick, nominal.
    - b. Finish/Color: Unpolished (UPS) Finish" including corners and site cut borders.
      1) Color: PT-4: Electric Moss, #VL72
    - c. Refer to Drawings for additional information.
- C. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:
  - 1. Size: As indicated or required, coordinated with sizes and coursing of adjoining flat tile.

# 2.3 THRESHOLDS

A. Stone Thresholds: Provide sound Group "A" marble threshold of profile indicated with an abrasive hardness of not less than 10.0 when tested in accordance with ASTM C 241. Maximum height 1/2" above finished floor. Furnish white marble for thresholds, unless otherwise indicated.

# 2.4 COLORS AND PATTERNS

A. As selected by Architect from manufacturer's <u>full color line</u> (including premium colors -Groups 2 through 5, unless specified above) and patterns of each type tile specified. Patterns shall be defined as using not more than 3 different colors of tile in any given area,

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applied in stripes, diagonals, checkerboard pattern or 45 degree layouts and other designs as determined by the Architect. All selections shall be made from manufacturer's <u>full product</u> <u>lines</u> (including premium colors).

## 2.5 SETTING AND GROUTING MATERIALS

- A. Portland Cement Mortar Installation Materials: Provide materials to comply with ANSI Standards as required for installation method designated, unless otherwise indicated.
- B. Large Format Floor and Wall Tile Mortar:
  - 1. Basis of Design: "Ultraflex LFT", as manufactured by MAPEI; or approved equal.
    - a. Modified dry-set cement mortar, fast setting for large and heavy tile thin-set applications complying with ANSI A118.4, A118.11 and ISO 13007 C2TES1.
    - b. Multipurpose: Ideal for floor and wall tile 15" x 15" (38 x 38 cm) and larger, and can also be used to install small-format tile.
    - c. Nonslump formula for large-format, heavy tile/stone in floor applications.
    - d. Non-sag formula for large-format, heavy tile/stone in wall applications.
    - e. For thicker bond coats from 3/32" to 1/2" (2.5 to 12 mm).
    - f. Unique formulation allows easier installation of large tile.
    - g. ANSI: Exceeds ANSI A118.4HTE and ANSI A118.11 requirements.
    - h. Warranty: Twenty-five (25) Year Commercial System Limited Warranty.

## 2.6 MISCELLANEOUS MATERIALS

- A. Tile Cleaner: Product specifically acceptable to manufacturer of tile and grout manufacturer for application indicated and as recommended by National Tile Promotion Federation, 112 North Alfred St., Alexandria, VA 22134 or Ceramic Tile Institute, 700 N. Virgil Ave., Los Angeles, CA 90029. Provide a neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- B. Grout and Tile Sealer: Manufacturer's standard product for sealing tile and grout joints that does not change color or appearance of grout.
  - 1. Provide colorless and stain resistant penetrating sealer with Ph factor between 7 and 10, that does not affect color or physical properties of tile surfaces.
  - 2. Products:
    - a. Custom Building Products; Surfaceguard Tile and Grout Sealer.
    - b. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
    - c. Or approved equal.
  - 3. Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- C. WATERPROOFING MATERIALS:
  - 1. Sheet Membrane: 0.030 inch thick chlorinated polyethylene (CPE) sheet with nonwoven polyester laminated to both sides, 60 inches wide.

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- Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:
   a. "Dal-Seal TS"; by Dal-Tile Corporation; or approved equal.
- D. Waterproofing / Crack Isolation Membrane at Porcelain Tile installation:
  - 1. Basis of Design: "Hydroban®" as manufactured Laticrete International, Inc.; or approved equal.
  - 2. Single component self-curing liquid rubber polymer that forms a flexible, seamless waterproofing membrane.
    - a. Exceeds ANSI A118.10 and A118.12.
    - b. Contains antimicrobial product protection.
- E. Leveling and Patching Compounds: Latex types as recommended by flooring manufacturer.

### PART 3 - EXECUTION

### 3.1 TILE INSTALLATION STANDARDS

- A. ANSI Tile Installation Standard: Comply with applicable parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for installation of ceramic tile.
- B. TCNA Installation Guidelines: TCNA "Handbook for Ceramic Tile Installation (latest edition)"; comply with TCNA installation methods indicated or, if not otherwise indicated, as applicable to installation conditions shown.
- C. Comply with manufacturer's instructions for mixing and installation of proprietary materials.

# 3.2 INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
  - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
    - a. Tile floors in wet areas.
    - b. Tile floors consisting of tiles 8 by 8 inches (200 by 200 mm) or larger.
    - c. Tile floors consisting of rib-backed tiles.
- B. Surface Preparation:
  - 1. All surfaces should be between 40°F (4°C) and 90°F (32°C) and structurally sound, clean and free of all dirt, oil, grease, paint, concrete sealers or curing compounds.
  - 2. Rough or uneven concrete surfaces should be made smooth with a latex fortified underlayment or leveling mortar to provide a proper finish.

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- 3. Dry, dusty concrete slabs or masonry should be dampened and excess water swept off.
- 4. Installation may be made on a damp surface.
- 5. New concrete slabs shall be damp cured and 28 days old before application.
- 6. All slabs must be plumb and true to within 1/4" (6 mm) in 10 ft (3 m).
- 7. Expansion joints shall be provided through the tile work from all construction or expansion joints in the substrate. Follow ANSI specification A108.01–3.7 "Requirements For Movement Joints: Preparations by Other Trades" or TCNA detail EJ-171 "Movement Joints—Vertical & Horizontal". Do not cover expansion joints with mortar.
- C. Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures and other penetrations so that plates, collars, or covers overlap tile.
- E. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- F. Set marble thresholds in same type of setting bed as field tile, unless otherwise indicated.
- G. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise shown.
- H. Expansion Joints: Locate expansion joints and other sealant filled joints, including control, contraction and isolation joints, where indicated or where joints occur in substrate. Do not saw cut joints.
- I. Grout tile to comply with the referenced standards, using grout material as indicated.
- J. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
  - 1. Glazed Wall Tile: 1/8 inch (3.2 mm).
  - 2. Porcelain Tile: 1/4 inch (6.4 mm).
- K. Movement Joints (EJ171):
  - 1. Perimeter and field movement joints within a tile installation are essential and required.
  - 2. Location and Frequency:
    - a. Interior: 20' to 25' in each direction.
    - b. Interior tilework exposed to direct sunlight or moisture: 8' to 12' in each direction.
    - c. Above-ground concrete slab substrate: 8' to 12' in each direction.

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- d. Perimeter Joints: Movement joints are required where tilework abuts restraining surfaces such as perimeter walls, dissimilar floor, curbs, columns, pipes, ceilings, and where changes occur in backing materials, but not at drain strainers.
- e. All expansion, control, construction, cold-saw, isolation, contraction, and seismic joints in the structure should continue through the tilework, including such joints at vertical surfaces.
  - 1) If proprietary crack isolation membrane is specified over saw cut joints to relocate a movement joint, contrary to EJ-171, the tile contractor is not responsible for cracking in grout joints or tile where tile has been installed over any such relocated movement joints, provided the tile, membrane, and other materials are installed correctly; this includes curling and/or deformation of the concrete occurring after installation of the membrane.
  - 2) Where tile pattern falls diagonally across a saw-cut joint, relocation of the movement joint is specifically not recommended because of the reduced performance of the sealant when used in a saw tooth or other non-linear fashion.
- 3. Joint Width:
  - a. Interior for quarry tile or paver tile: Same as grout joint, but not less than 1/4".
  - b. Interior for ceramic mosaic tile and glazed wall tile: Preferred not less than 1/4", but never less than 1/8".
  - c. Joints in tile and setting materials shall never be less than the width of the saw-cut control joint width.
  - d. Joints through tilework directly over structural joints must never be narrower than the structural joint.
- 4. Materials:
  - a. Backup strip shall be a flexible and compressible type of closed-cell foam polyethylene, butyl rubber, or open cell and closed sell polyurethane, rounded at surface to contact sealant, as shown in details, and as recommended by sealant manufacturers. It mus fit neatly into the joint without compacting and to such a height to allow a sealant depth of ½ the width of the joint. Sealant **must not** bond to the backup material.
  - b. Suitable sealants include silicone, urethane, and polysulfide. Sealants are available in both single- and multicomponent formulations.

# 3.3 FLOOR INSTALLATION METHODS

- A. Porcelain Tile: Install tile to comply with requirements indicated below for setting bed method, TCNA installation method related to type of subfloor construction, and grout type and in accordance with applicable ANSI installation specifications:
  - 1. Concrete Subfloor, Interior, slab on grade or above-ground: TCNA F112 (bonded).
    - a. Mortar: Latex portland cement; ANSI A118.4 or better or ISO C2 or better.
    - b. Grout: Epoxy; ANSI A118.3 or ISO RG.

# 3.4 WALL TILE INSTALLATION METHODS

A. Install types of tile designated for wall application to comply with requirements indicated below for setting bed methods, TCNA installation methods related to subsurface wall conditions, and grout types and in accordance with applicable ANSI installation specifications:

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- 1. Masonry or Concrete, Interior: TCNA W202I.
  - a. Mortar: Latex portland cement; ANSI 118.4 or better or ISO C2 or better.
  - b. Grout: Latex portland cement; ANSI 118.6 or better or ISO CG1 or better.
- 2. Gypsum Board, Interior: TCNA W242.
  - a. Organic Adhesive; ANSI 136.1 (Type I or II) or ISO D1 or better.
  - b. Grout: Latex portland cement; ANSI 118.6 or better o ISO CG1 or better.

# 3.5 CLEANING AND PROTECTION

- A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  - 1. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile work.
- C. Protection: When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage and wear.
  - 1. Prohibit foot and wheel traffic from using tiled floors for at least 7 days after grouting is completed.
  - 2. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

# END OF SECTION 09300

# **SECTION 09510 - ACOUSTICAL CEILINGS**

### 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. Extent of each type of acoustical ceiling is shown and scheduled on the Drawings.
- B. Type of acoustical ceilings specified in this section includes lay in acoustical ceiling board, exposed suspension system.

# 1.3 QUALITY ASSURANCE

- A. Installer: Firm with a recommended three years of successful experience in installation of acoustical ceilings similar to requirements for this project and which is acceptable to manufacturer of acoustical units, as shown by current written statement from manufacturer.
- B. Fire Resistance Ratings: As indicated by reference to design designation in UL "Fire Resistance Directory" for floor, roof or beam assemblies in which acoustical ceilings function as a fire protective membrane; tested per ASTM E 119. Provide protection materials for lighting fixtures and air ducts to comply with requirements indicated for rated assembly.
- C. Surface Burning Characteristics: As follows, tested per ASTM E 84.
  - 1. Flame Spread: 25 or less.
  - 2. Smoke Developed: 50 or less.
- D. All acoustical ceilings shall be installed to conform to the requirements of International Building Code for Category C and the recommendation of the Ceiling and Interior Systems Construction Association (CISCA) for Zone 2 seismic design and comply with installation requirements for areas subject to light to moderate seismic activity.
- E. General Contractor shall provide adequate ventilation and humidity control before, during and after ceiling installation to prevent damage (sagging, etc.) to ceilings prior to Owner's acceptance of building.
- F. Warranty:
  - 1. Provide manufacturer's special project warranty against sagging or warping of acoustic ceiling boards for a minimum period of **thirty (30) years** which starts on approved date of substantial completion.
- G. Unless otherwise approved by the Architect, all Acoustical Ceiling Board types and Suspended Grid System types shall be by a single manufacturer.

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## 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required including certified test reports to show compliance with requirements of these specifications.
  - 1. Include manufacturer's recommendations for cleaning and refinishing acoustical units, including precautions against materials and methods which may be detrimental to finishes and acoustical performance.
- B. Samples: Submit manufacturer's standard size samples of acoustical units, but not less than 6" square, and of exposed ceiling suspension members including wall and special moldings. Provide samples showing full range of colors, textures and patterns available for each type of component required.
- C. Shop Drawings: Submit shop drawings for acoustical ceilings, including layout of system components and details of connections between elements of system and between system and other building components.
  - 1. Contractor must provide shop drawings certifying that attachment devices meet specified loads. Contractor must coordinate with all other Prime Contractors / Subcontractors for fixture loads, etc.
- D. Testing Reports: Submit testing reports which indicate compliance with indicated requirements.
- E. Deliver extra materials to Owner. Furnish extra materials described below matching products installed, packaged with protective covering for storage and identified with appropriate labels.
  - 1. Acoustical Ceiling Units: Furnish quantity of full size units equal to 2.0% (rounded up to the nearest full carton) of each type of acoustic unit installed.
  - 2. Exposed Suspension System Components: Furnish quantity of each exposed component equal to 2.0% (rounded up to the nearest full carton) of each type suspension component installed.

### **1.5 PROJECT CONDITIONS**

A. Space Enclosure: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

# PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Basis of Design: Provide Acoustical Ceiling Board (ACB and AACB) and Metal Suspension System as manufactured by Armstrong World Industries; United States Gypsum Co.; CertainTeed Ceilings; or approved equal.

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- B. Acoustical Ceiling Tile and Grid system products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.
  - 1. Comparable products of the following manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements and other design attributes listed as performance of the "Basis of Design" Systems.
    - a. USG Corporation,
    - b. CertainTeed Ceilings.
    - c. Rockfon, LLC,
    - d. Or approved equal.
  - 2. The use of one manufacturer's catalog numbers, and the specific requirements set forth in Drawings and Specifications, are not intended to preclude the use of other manufacturer's products or procedures which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.
- C. Substitute products will be considered for substitution only when submitted to the Architect as per the requirements of AIA A201 and Section 00800.

# 2.2 ACOUSTICAL CEILING BOARDS

- A. Refer to reflected ceiling plans for sizes and locations.
- B. Where ACB-1 is indicated: 24" x 48" x 7/8" thick, square edge, NRC .80; CAC 35 light reflectance 87%, sag resistance; Humiguard Plus Performance. Armstrong Ultima High NRC (Item# 1943); equivalent from USG, CertainTeed; or approved equal. [Unperforated]
- C. Where AACB is indicated: 24" x 48" x 5/8" thick, square edge, CAC 40; Class A; light reflectance 88%, Sag Resistance; HumiGuard Max Performance, mineral fiber composition with ceramic binders. Armstrong Fine Fissured Ceramaguard (Item# 605), white finish; or approved equal. [Unperforated]

# 2.3 METAL SUSPENSION SYSTEMS, GENERAL

- A. Standard for Metal Suspension Systems: Provide metal suspension systems of type, structural classification and finish indicated which comply with applicable ASTM C 635 requirements.
- B. Finishes and Colors: Provide manufacturer's standard factory-applied finish for type of system indicated. For exposed suspension members and accessories with painted finish, provide color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's full range of standard colors.
- C. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung.
- D. Concrete Inserts: Inserts formed from hot-dipped galvanized sheet steel and designed for attachment to concrete forms and for embedment in concrete, with holes or loops for attachment at hanger wires.

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- E. Hanger Wire: Galvanized carbon steel wire, ASTM A 641, soft temper, prestretched, Class 1coating, sized so that 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 12gage (0.106").
- F. Type of System: Either direct-hung or indirect-hung suspension system, at Contractor's option.
  - 1. Carrying Channels: 1-1/2 inch steel channels, hot-rolled or cold-rolled, not less than 0.475 lbs. per lineal foot.
- G. Edge Moldings and Trim: Metal types and profiles indicated or, if not indicated, provide manufacturer's standard molding for edges and penetrations of ceiling which fits with type of edge detail and suspension system indicated. Provide 7/8" edge at wall angle and reveal edges.
- H. Hold-Down Clips: For interior ceilings composed of lay-in panels weighing less than 1 lb. per sq. ft., or where indicated, provide hold-down clips spaced 2'-0" o.c. on all cross tees.

## 2.4 EXPOSED METAL SUSPENSION SYSTEMS

- A. Double Web Steel Suspension System: For use where ACB ceilings are indicated. Manufacturer's standard system roll-formed from prefinished hot dipped galvanized steel with 15/16" wide exposed faces on flanges of structural members; other characteristics as follows:
  - 1. Structural Classification: Intermediate-Duty System.
  - 2. Finish: Painted in color as selected by Architect.
  - 3. Basis of Design: Armstrong World Industries "Prelude XL Exposed Tee System"; USG "Donn Brand DX", CertainTeed 15/16" Classic Stab; or approved equal.
- B. Double Web Suspension System: For use where AACB ceilings are indicated. Manufacturer's standard system fabricated from roll-formed prefinished hot dipped galvanized steel with 15/16" wide exposed faces of aluminum cap on flanges of structural members cap and other characteristics as follows:
  - 1. Structural Classification: Intermediate-Duty System.
  - 2. Finish: Painted, in colors as selected from manufacturer's full line of colors. Provide white color unless indicated otherwise.
  - 3. Basis of Design: Armstrong World Industries "Prelude Plus XL Fire Guard"; USG "Donn Brand DXA/DXLA", CertainTeed 15/16" FireSecure; or approved equal.

### 2.5 MISCELLANEOUS MATERIALS

A Acoustical Sealant: Resilient, non-staining, non-shrinking, non-hardening, non-skinning, non-drying, non-sag sealant intended for interior sealing of concealed construction joints.

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### PART 3 - EXECUTION

### 3.1 INSPECTION

A. Examine conditions under which acoustical ceiling work is to be performed and notify Architect in writing of unsatisfactory conditions. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner.

#### 3.2 **PREPARATION**

- A. Coordination: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.
- B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.

#### 3.3 INSTALLATION

- A. General: Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire-resistance rating requirements as indicated, and CISCA standards applicable to work.
- B. Arrange acoustical units and orient directionally-patterned units (if any) in manner shown by reflected ceiling plans.
  - 1. Install tile with pattern running in one direction, unless otherwise indicated.
- C. Install suspension systems to comply with ASTM C 636, with hangers supported only from building structural members. Locate hangers not less than 6" from each end and spaced 4'-0" along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of 1/8" in 12'-0".
  - 1. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperatures.
- D. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.
  - 1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.
  - 2. Screw-attach moldings to substrate at intervals not over 16" o.c. and not more than 3" from ends, leveling with ceiling suspension system to tolerance of 1/8" in 12'-0". Miter corners accurately and connect securely.
  - 3. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.

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- 4. Install hold-down clips in areas indicated, and in areas where required by governing regulations or for fire-resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.
- E. Cooperate with other trades and Contracts for installation of their materials and equipment, particularly with those installing the ductwork, ceiling diffusers and lighting fixtures so that diffusers, lighting fixtures and other items are located on center lines of tile or on centers of joints as shown on approved shop drawings.
  - 1. Provide additional hanger wires to support cubicle curtain tracks, and other superimposed loads. Locate the supplemental hangers within 6 inches of each corner of the item being supported.
  - 2. Where light fixtures, or other recessed items occur in ceilings, frame acoustical material properly to permit installation of such recessed items and do all necessary cutting and fitting of acoustical materials and suspension systems to accommodate same. Cut neatly around all pipes passing through ceilings. Build in fixture frames and yokes in cooperation with Electrical Subcontractor.

# 3.4 CLEANING

A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage. General Contractor is responsible for cleaning or replacement of all damaged tile, regardless of how the damage was caused and regardless of by which Contractor.

### END OF SECTION 09510

## **SECTION 09650 - RESILIENT FLOORING**

#### 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 DESCRIPTION OF WORK**

- A. Extent of resilient flooring and accessories is shown on Drawings and in schedule.
  - 1. Vinyl composition tile (VCT).
  - 2. Rubber resilient wall base.

### **1.3 RELATED SECTIONS**

- A. Section 01455 Concrete In-situ Relative Humidity and pH Testing.
- B. Section 03300 Cast in Place Concrete Slabs on Grade.
- C. Section 03450 Self-Drying Finishing Underlayment.
- D. Section 07900 Joint Sealer Assemblies.

#### 1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:
  - 1. ASTM F 2170-11 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
  - 2. ASTM F 1869-11 Standard Test Method Using Anhydrous Calcium Chloride.
  - 3. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
  - 4. ASTM F 1861 Type TS, Group 1 Performance Requirements for Resilient Rubber Wall Base.
  - 5. ASTM F 137 Standard Test Method for Flexibility of Resilient Flooring Materials protocol for Resilient Rubber Wall Base.
  - 6. ASTM F 1515 Standard Test Method for Measuring Light Stability of Resilient Flooring protocols for Resilient Rubber Wall Base.
  - 7. ASTM D 2240 Not less than 85 Shore A.
  - 8. ASTM D 3389 Abrasion Resistance: less than 1 gram weight loss.

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- 9. ASTM D 2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring of 0.6 or greater.
- 10 ASTM E 648 Standard Test Method for Critical Radiant Flux of 0.45 watts/cm2 or greater, Class I.
- B. Moisture vapor emission testing in accordance with ASTM F 1869-11. Test results should not exceed 3 pounds per 1,000 square feet per 24 hours, unless otherwise specified by the flooring or adhesive manufacturer.
  - 1. ASTM Standard also states that relative humidity inside of the concrete slab should not exceed 75%, per ASTM F2170-11, unless otherwise specified by the flooring or adhesive manufacturer.
- C. Manufacturer: Provide each type of resilient flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds.
  - 1. Wherever possible, provide each type of required resilient flooring and accessories produced by a single manufacturer.
- D. Fire Test Performance: Provide resilient flooring which complies with the following fire test performance criteria as determined by an independent testing laboratory acceptable to authorities having jurisdiction.
  - 1. ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials, Class A, Smoke <450.
  - 2. ASTM E648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm<sup>2</sup> or greater, Class 1.
- E. Coefficient of Friction: The Federal and industry standard for testing coefficient of friction or the slip resistance of a surface is tested to the requirements, as outlined, in ASTM D-2047, which utilizes a friction measurement machine, commonly referred to as the James Machine.

# 1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each type of resilient flooring and accessory.
- B. Samples for Verification Purposes: Submit the following samples in triplicate of each type, color, and pattern of resilient flooring required, showing full-range of color and pattern variations.
  - 1. Full size tile samples.
  - 2. For initial selection of colors and patterns submit, prior to above, samples in form of actual sections of resilient flooring, including accessories, showing full range of colors and patterns available, for each type of resilient flooring required.

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- C. Certification for Fire Test Performance: Submit certification from an independent testing laboratory acceptable to authorities having jurisdiction that resilient flooring complies with fire test performance requirements.
- D. Testing of Substrate:
  - 1. Submit test reports of testing the concrete or other floor substrate, indicating compliance with manufacturer's requirements for moisture and alkalinity percentage of contents. Tests shall be performed in accordance with requirements of Section 01455.
- E. Maintenance Instructions: Submit 2 copies of manufacturer's recommended maintenance practices for each type of resilient flooring and accessory required.
- F. Replacement Material: After completion of work, deliver to project site replacement materials from same manufactured lot as materials installed, and as follows:
  - 1. Tile flooring, not less than one box for each 50 boxes or fraction thereof, for each type, size and color installed.

# 1.6 **PROJECT CONDITIONS**

- A. Maintain minimum temperature of 65°F (18°C) or more than 85°F (29°C) in spaces to receive resilient flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation.
  - 1. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation.
- B. Maintain the ambient relative humidity between 40% and 60% during installation.
- C. Install resilient flooring and accessories after other finishing operations, including painting, have been completed.
- D. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55°F (13°C) or more than 85°F (29°C).
- E. Do not install resilient flooring over concrete slabs until the latter have been cured and are sufficiently dry to achieve bond with adhesive as determined by resilient flooring manufacturers and their recommendation for bond and maximum levels of moisture and pH per testing as performed under requirements of Section 01455.

# 1.7 WARRANTY

- A. Vinyl Composition Tile (VCT):
  - 1. Manufacturer warrants its regular (first quality) commercial floor products to be free from manufacturing defects for **five (5) years** from date of purchase.
    - a) Within One(1) Year of Purchase: If a defect covered by this warranty is reported to Manufacturer in writing within one(1) year of purchase, Manufacturer will replace/repair at its discretion the defective product including reasonable labor

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charges for installation. Manufacturer will replace it with similar quality first grade material or repair the defect. The replaced or repaired material is warranted for the time then remaining under this original Warranty.

- b. Within Two(2) Years of Purchase: If a defect covered by this warranty is reported to Manufacturer in writing within two(2) years of purchase, Manufacturer will replace or repair at its discretion the defective product and pay 50% of a reasonable labor charge for installation.
- c. **After Two(2) Years** of Purchase: If a defect covered by this warranty is reported to Manufacturer in writing after two(2) years but within ten(10) years of purchase, Manufacturer will replace or repair at its discretion defective material only (excluding cost of installation).
- d. <u>Otherwise</u>: Within Five(5) Years of Purchase: Installation is not according to Manufacturer's Engineered Installation Systems. If a defect covered by this warranty is reported to Manufacturer in writing within five(5) years of purchase, Manufacturer will replace or repair at its discretion defective material only (excluding cost of installation).
- e Manufacturer does not warrant the installers' workmanship. Workmanship errors should be addressed to the contractor who installed the floor.
- B. Wall Base: **Five (5) year** Limited Commercial warranty.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but not limited to the following:
  - 1. Vinyl Composition Tile (VCT); provide the following:
    - a. Standard Excelon Imperial Texture and Standard Excelon MultiColor, as manufactured by Armstrong World Industries;
    - b. Essentials, Designer Essential and Inspiration, as manufactured by Mannington Commercial;
    - c. Or approved equal.
  - 2. Rubber Resilient Wall Base and Accessories:
    - a. Pinnacle, as manufactured by Roppe Corporation;
    - b. BaseWorks Thermoset Rubber Wall Base, as manufactured by Johnsonite,
    - c. RubberMyte, as manufactured by Burke Mercer Flooring Product,
    - d. Equivalent by Mohawk,
    - e. Or approved equal.
- B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.
  - 1. The use of one manufacturer's catalog numbers, and the specific requirements set forth in drawings and specifications, are not intended to preclude the use of other products by other manufacturer's or which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.

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C. Comparable products of other manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements, intended performances and all other design attributes listed above and provided that deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances as judged solely by the Architect/Owner.

# 2.2 VINYL COMPOSITION TILE FLOORING

- A. Vinyl Composition Tile: ASTM F 1066, Class 2, through pattern, 12" x 12" unless otherwise indicated, and as follows:
  - 1. Asbestos-free.
  - 2. Gauge: 1/8 inch.
- B. Provide vinyl composition tile to meet indicated "Basis of Design" products and quality assurance requirements indicated in Articles 1.2 and 2.1 of this Specifications.

# 2.3 ACCESSORIES

- A. Wall Base: Provide rubber base complying with ASTM F-1861, Type TS, Group 1. Vulcanized SBR rubber with matching preformed corner units, and as follows:
  - 1. Height: 4-inches, unless otherwise indicated on the drawings.
  - 2. Thickness: 1/8 inch gauge.
  - 3. Style: Standard top-set cove.
  - 4. Finish / Colors: Matte finishes in colors as selected by Architect from manufacturer's available full range of colors. Allow for more than one color in any given area.
  - 5. Color Stability: Meets or exceeds ASTM F 1861 requirements for color stability when tested to ASTM F 1515 Standard Test Method for Measuring Light Stability of Resilient Flooring protocols.
  - 6. Phthalate, chlorine and halogen free.
- B. Adhesives (Cements): Water resistant, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions.
  - 1. Adhesives to be used for resilient floor applications <u>shall not</u> generate any odor or unpleasant smell.
- C. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.
- D. Leveling and Patching Compounds: Latex types as recommended by flooring manufacturer.
- E. Slip Retardant Polish: Provide slip-retardant polish as recommended by resilient tile manufacturer.

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# 1. POLISH FOR RESILIENT FLOORING

a. Floor Polish: Contractor shall provide floor polish to achieve the Static Coefficient of Friction; per ASTM D 2047, of 0.5 or better for level surfaces and as per requirements of state and local codes having jurisdictions.

# 2.4 COLORS, TEXTURES AND PATTERNS

- A. Colors, textures and patterns shall be as selected and directed by the Architect. Patterns shall be defined as using not more than <u>five (5) different colors of tile in any given area, applied</u> in boarders, stripes, diagonals, checkerboard patterns and other designs as indicated, or if not indicated, shall be as directed by the Architect.
  - 1. All selections shall be made from manufacturer's <u>full product lines</u>, for all products and accessories, (including premium textures and colors).

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. General: Inspect substrates and conditions of installation to verify that work may properly commence. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Concrete Substrates: Perform concrete relative humidity and pH testing and to comply with manufacturer's recommended moisture tests before beginning installation, to verify that concrete surfaces have cured sufficiently to allow adhesive bond to resilient flooring.
  - 1. Commencement of work shall constitute acceptance of conditions. Any necessary remedial work required to correct any unsatisfactory conditions, found after the start of installation, will be provided at no cost to the Owner.

### 3.2 **PREPARATION**

- A. Perform moisture content testing as required by manufacturer's instructions to ensure pH readings and moisture transmission are acceptable. Perform testing in accordance with requirements of Section 01455.
  - 1. If values exceed this level, follow manufacturer's recommendations for moisture transmission mitigation. Do not proceed until unsatisfactory conditions have been corrected.
- B. Broom clean or vacuum surfaces to be covered, and inspect subfloor.
  - 1. Use leveling and patching compounds as recommended by resilient flooring manufacturer for filling small cracks, holes and depressions in subfloors.
  - 2. Apply concrete slab primer and/or sealer, as recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.
  - 3. Remove paint, curing compounds, and other materials that could interfere with adhesion of resilient products.

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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.

# 3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with manufacturer's published recommendations for installation in each area, extending resilient flooring into spaces which are partially concealed. Cut and fit tightly to fixtures, pipes, and other obstructions, as well as to walls and partitions.
- B. Access Covers: Install resilient flooring tightly to removable access covers in field of flooring, taking care that pattern will match when covers are in closed position.
- C. Tightly adhere resilient flooring to substrate with no open joints or cracks, and without raised or blistered areas. Spread adhesive evenly, so that final installation will be without telegraphed markings from adhesive or substrate.
- D. Extend resilient flooring into toe spaces, door reveals, and into closets and similar openings.
- E. Scribe, cut, and fit resilient flooring to permanent fixtures, built-in furniture and cabinets, pipes, outlets and permanent columns, walls and partitions.
- F. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.
- G. Install resilient flooring on covers for telephone and electrical ducts, and similar items occurring within finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers. Tightly cement edges to perimeter of floor around covers and to covers.
- H. Tightly cement resilient flooring to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Hand roll resilient flooring at perimeter of each covered area to assure adhesion.

# 3.4 INSTALLATION OF TILE FLOORS

- A. Lay tile from center marks established with principal walls, discounting minor offsets, so that tile at opposite edges of room area of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis, unless otherwise shown.
- B. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all fixtures. Broken, cracked, chipped, or deformed tiles are not acceptable.
  - 1. Lay tile in pattern shown or as directed by Architect.
- C. Adhere tile flooring to substrates using full spread of adhesive applied in compliance with flooring manufacturer's directions.

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D. Expansion Joints: Locate expansion joints and other sealant filled joints, including control, contraction and isolation joints, where indicated or where joints occur in substrate. Do not saw cut joints.

## 3.5 INSTALLATION OF ACCESSORIES

- A. Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.
  - 1. Job-formed Corners:
    - a. Outside Corners: Form by bending without producing discoloration (whitening) at bends.
    - b. Inside Corners: Butt one piece to corner, then scribe next piece to fit.
- B. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
- C. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed.

## 3.6 CLEANING AND PROTECTION

- A. Perform following operations immediately upon completion of resilient flooring:
  - 1. Sweep or vacuum floor thoroughly.
  - 2. Do not wash floor until time period recommended by resilient flooring manufacturer has elapsed to allow resilient flooring to become well-sealed in adhesive.
  - 3. Damp-mop floor being careful to remove black marks and excessive soil.
  - 4. Remove any excess adhesive or other surface blemishes, using appropriate cleaner recommended by resilient flooring manufacturers.
- B. Protect flooring against damage during construction period to comply with resilient flooring manufacturer's directions.
  - 1. Apply protective floor polish to resilient flooring surfaces free from soil, excess adhesive or surface blemishes. Use commercially available metal cross-linked acrylic product acceptable to resilient flooring manufacturer.
  - 2. Protect resilient flooring against damage from rolling loads for initial period following installation by covering with plywood or hardboard. Use dollies to move stationary equipment or furnishings across floors.
  - 3. Cover resilient flooring with undyed, untreated building paper until inspection for substantial completion.

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- C. Clean resilient flooring not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Clean resilient flooring by method recommended by resilient flooring manufacturer.
- D. Strip protective floor polish, which was applied after completion of installation, prior to cleaning.
  - 1. Reapply floor polish after cleaning.

## 3.7 EXTRA STOCK

- A. Deliver stock of maintenance materials to Owner. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.
  - 1. Tile Flooring: Furnish not less than one box for each 50 boxes or fraction thereof, for each type, color, pattern and size selected and installed.
  - 2. Accessories: Furnish not less than 2% of each type, size and color selected and installed.

## END OF SECTION 09650

#### SECTION 09900 - PAINTING

### 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.
- B. Related Section(s):
  - 1. Section 04200 Unit Masonry.
  - 2. Section 05400 Miscellaneous Structural Steel.
  - 3. Section 05500 Metal Fabrications.
  - 4. Section 08110 Hollow Metalwork.
  - 5. Section 08211 Wood Doors for light frames.
  - 6. Section 09250 Gypsum Drywall.
  - 7. Division 23 Mechanical Work.
  - 8. Division 26 Electrical Work.

# **1.2 DESCRIPTION OF WORK**

- A. Extent of painting work is indicated on Drawings, Room Finish Schedule and as herein specified.
- B. Work includes painting and finishing of interior and exterior exposed items and surfaces throughout project, except as otherwise indicated.
  - 1. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
- C. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
- D. Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors are designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will select these from standard colors or finishes available.
- E. Following categories of work are not included as part of field-applied finish work.
  - 1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, steel windows, miscellaneous metal, hollow metal work, and similar items. Also, for fabricated components such as architectural woodwork, wood casework, and shop fabricated or factory built mechanical and electrical equipment or accessories. This is in addition to the prime coat specified herein.

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- 2. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified for such items as (but not limited to) metal toilet enclosures, prefinished partition systems, acoustic materials, architectural woodwork and casework, and shop fabricated or factory built mechanical and electrical equipment, including light fixtures, switchgear and distribution cabinets.
- 3. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
- 4. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.
- 5. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting.
- 6. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment, identification, performance rating, name, or nomenclature plates.
- F. Mechanical and Electrical Work: Painting of mechanical and electrical work is specified herein.
  - 1. Painting of mechanical and electrical work is limited to those items exposed to view.
  - 2. Mechanical items to be painted include, but are not limited to, the following:
    - a. Piping, pipe hangers and supports.
    - b. Ductwork, insulation.
    - c. Access doors and service panels.
  - 3. Electrical items to be painted include, but are not limited to, the following:
    - a. Conduit and fittings.
    - b. Backboxes.
    - c. Junction boxes.

# 1.3 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.
- B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.
- C. Industry Standards: Comply with industry standard established by the Painting and Decorating Contractors of America PDCA for applications, methods and recommendations and use of tools and equipment for paint and stain coatings, primers and block fillers.

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## D. Lead and Chromate Contents:

- 1. All paint products must be free of any lead or chromate contents.
- E. Volatile Organic Compound Compliant (VOC.):
  - 1. All paint products must meet the State VOC environmental regulations (OTC Regulation compliant) and the following:
    - a. Chemical Components of Interior Paints and Coatings: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions:
      - (1) Primer, Sealer and Undercoater: VOC content of not more than 200 g/L.
      - (2) Specialty Primer, Sealer and Undercoater: VOC content of not more than 350 g/L.
      - (3) Rust Preventative Coating: VOC content of not more than 400 g/L.
      - (4) Flat Paints and Coatings: VOC content of not more than 100 g/L.
      - (5) Non-Flat Paints and Coatings: VOC content of not more than 150 g/L.
      - (6) Nonflat High Gloss Coatings: VOC content of not more than 250 g/L.
      - (7) Varnishes and Sanding Sealers: VOC content of not more than 350 g/L.
      - (8) Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
- F. Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on characteristics of finish materials proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Architect in writing of any anticipated problems using specified coating systems with substrates primed by others.
  - 1. At galvanized surfaces, primer shall be a zinc dust-zinc oxide coating.

## 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.
- B. Samples: Prior to beginning work, Contractor shall furnish color chips (2 fan decks) for surfaces to be painted. Use representative colors when preparing samples for review. Submit samples for Architect's review of color and texture only. Provide a listing of material and application for each coat of each finish sample.
  - 1. On 12" x 12" hardboard, provide two samples of each color and material, with texture to simulate actual conditions. Resubmit samples as requested by Architect until acceptable sheen, color, and texture is achieved.
  - 2. On concrete masonry, provide complete walls or portions of walls as sample mock-ups and in sizes and locations as directed by the Architect;

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- a. Mock-up wall samples shall be for painting on masonry for each type of finish and color, defining filler, prime and finish coat.
- b. Mock-up wall samples shall remain until authorized by the Architect for use as part of the work.
- C. Acknowledgment of Bid Documents: Contractor / Installer shall submit to the Architect certifications signed by each of the Contractor and Installer attesting acknowledgment of requirements of the Bid Documents for specific project requirements indicated in this specifications.
  - 1. Installer shall submit proof of evidence, (this project Specification section) with their letter of certificate.
  - 2. Contractor / Installer shall not proceed with painting work of this section until submittal of required certifications are completed.
  - 3. Any work performed prior to completion of this submittal shall be subject to total rejection by the Architect. All rejected work shall be rectified without any additional cost to the Owner.
- D. Coating Maintenance Manual: Upon conclusion of the project, the Contractor in conjunction with the coating manufacturer shall furnish a coating maintenance manual such as the Sherwin-Williams " Custodian Project Color and Product Information" report or equal. Manual shall include an area summary with finish schedule, area detail designating where each product/color/finish was used, product data pages, SDS pages, care and cleaning instructions, touch up procedures and color samples of each color and finish used.

## 1.5 DELIVERY AND STORAGE

- A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:
  - 1. Name or title of material.
  - 2. Fed. Spec. number, if applicable.
  - 3. Manufacturer's stock number and date of manufacturer.
  - 4. Manufacturer's name.
  - 5. Contents by volume, for major pigment and vehicle constituents.
  - 6. Thinning instructions.
  - 7. Application instructions.
  - 8. Color name and number.

# **1.6 JOB CONDITIONS**

- A. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45°F (7°C) and 95°F (35°C), unless otherwise permitted by paint manufacturer's printed instructions.
- B. Do not apply paint in snow, rain, fog or mist, or when relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions.

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- C. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.
- D. Provide sufficient temporary illumination producing overall space/room minimum illumination level of 50 ft. candles while preparing or painting of surfaces and to assure the production of quality finishes.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to the following:
  - 1. M A B
  - 2. Benjamin Moore
  - 3. PPG Architectural Coatings
  - 4. The Sherwin-Williams Company
  - 5. Linetec Inc.
  - 6. Or approved equal

### 2.2 COLORS AND FINISHES

- A. Prior to beginning work, Contractor shall furnish color chips for surfaces to be painted from manufacturers <u>full line</u> of products. This shall include custom colors.
  - 1. Contractor shall allow for a total of 20 different colors of each type of paint, (excluding graphics and /or art work as indicated) with change of color within a room or space occurring either on a horizontal or vertical line, [allow for multiple (6) colors at each room unless otherwise shown]. Where roof structure is exposed, steel beams, steel joists and metal decking will be painted with different colors, as selected by the Architect.
  - 2. Contractor shall allow for split frames at all new and existing hollow metal door and borrowed lite frames to be painted.
  - 3. Final acceptance of colors will be from samples supplied on the job.
- B. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.

### 2.3 MATERIALS

- A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.
- B. Provide undercoat paint recommended and produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only within recommended limits.

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### 2.4 EXTERIOR PAINT SCHEDULE

- A. Basis of Design: Provide the following paint systems for the various substrates, or approved equal manufacturer / system:
- B. Semi-Gloss Enamel (Waterbased Alkyd Urethane Enamel Finish)
  - 1. 1st Coat: Sherwin-Williams, Extreme Bond Exterior Primer.
  - 2. 2nd Coat: Sherwin-Williams, Pro Industrial Waterbased Alkyd Urethane.
  - 3. 3rd Coat: Sherwin-Williams, Pro Industrial Waterbased Alkyd Urethane.
  - 4. Apply to the following exterior surfaces: Lintels, ferrous metal and other exterior assemblies to receive paint.
  - 5. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

## 2.5 INTERIOR PAINT SCHEDULE

- A. Semi-Gloss (Satin) Enamel:
  - 1. 1st Coat: Sherwin-Williams, Pro Industrial Pro-Cryl Universal Primer.
  - 2. 2nd Coat: Acrylic Enamel, Sherwin-Williams, Pro Industrial HP Acrylic.
  - 3. 3rd Coat: Acrylic Enamel, Sherwin-Williams, Pro Industrial HP Acrylic.
  - 4. Apply to following interior surfaces: Hollow metal work, metal lites for wood doors, miscellaneous steel and ferrous metal fabrications.
  - 5. Apply as many coats as necessary to produce a uniform substrate and finish appearance.
- B. Egg-Shell / Satin Enamel Acrylic Latex:
  - 1. Base Coats: Enamel Undercoat; Primer-Sealer to suit substrate or Loxon Block Surfacer for Concrete Masonry/CMU Block.
    - \* Block Filler shall be Level 3 Premium Fill; one or multiple coats for high performance block filler in accordance with PDCA industry standards. Apply mock-up to confirm appearance before application of finish coats.
  - 2. 2nd Coat: Sherwin-Williams, ProMar 200 Zero VOC Eg-Shel.
  - 3. 3rd Coat: Sherwin-Williams, ProMar 200 Zero VOC Eg-Shel.
  - 4. Apply to the following interior surfaces: Concrete masonry units, gypsum drywall and other interior assemblies to receive paint.

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- 5. Apply as many coats as necessary to produce a uniform substrate and finish appearance.
- C. Flat Acrylic Latex:
  - 1. 1st Coat: Sherwin Williams ProMar 200 Zero VOC Interior Latex Primer.
  - 2. 2nd Coat: Sherwin Williams, ProMar 200 Zero VOC Flat Interior Latex Flat.
  - 3. 3rd Coat: Sherwin Williams, ProMar 200 Zero VOC Flat Interior Latex Flat.
  - 4. Apply to following interior surfaces: Interior surfaces of ducts, where visible through registers or grilles, etc.
  - 5. Apply as many coats as necessary to produce a uniform substrate and finish appearance.

### 2.6 EXTRA STOCK

A. Contractor shall provide one gallon of extra stock for each color/type selected for use on the project. Provide unopened containers clearly marked with manufacturers color number and name.

### PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions, included rotted or otherwise defective materials, have been observed by all concerned and corrected in a manner acceptable to Applicator.
- B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

## 3.2 SURFACE PREPARATION

- A. General:
  - 1. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
  - 2. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.

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- 3. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.
- 4. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.
- 5. Painting of materials shall commence only when the moisture content of the materials complies with manufacturer's recommendations as follows:
  - a. Masonry 22% maximum.
  - b. Gypsum drywall 12% maximum.
- B. Cementitious Materials:
  - 1. Prepare cementitious surfaces of concrete, concrete block, cement plaster and gypsum drywall board to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.
  - 2. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
- C. Ferrous Metals:
  - 1. Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
  - 2. Touch-up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications. Clean and touch-up with same type shop primer.
  - 3. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent.

# 3.3 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
- D. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish

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coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

# 3.4 APPLICATION

- A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
- B. Where finish schedule calls for walls or ceilings to be painted, paint all new and existing surfaces in same area. Paint from corner to corner on walls or ceilings, or to a major change in direction of surface to be painted. Provide crisp, clean, sharp lines where new painted surfaces abut existing painted surfaces.
- C. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- D. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
- E. Sand lightly between each succeeding enamel coat.
- F. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
- G. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- H. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as recommended by coating manufacturer <u>and</u> an acceptable finished appearance in finish, color and appearance as determined by the Architect.
- I. Primer Coat: Apply primer coat of material which is required to be painted or finished, and which has not been prime coated by others.
  - 1. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- J. Block Fillers: Apply block fillers using manufacturer's recommended application techniques with sufficient material and coats to achieve a pinhole-free, "Level 3 Premium Fill Surface", and in accordance with PDCA 's industry standards.
- K. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

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L. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

## 3.5 CLEAN-UP AND PROTECTION

- A. Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.
- B. Upon completion of painting work, clean all paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- C. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
  - 1. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
  - 2. At completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

### END OF SECTION 09900

## SECTION 10100 - DRY MARKERBOARDS AND EXHIBITION BOARDS

### 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 DESCRIPTION OF WORK**

- A. Extent of dry markerboards and exhibition boards is indicated on the Drawings.
- B. Type of dry markerboards and exhibition boards specified in this section includes the following:
  - 1. Porcelain enamel steel dry marker boards.
  - 2. Fabricork fabric faced cork exhibition boards.
  - 3. Factory applied trim.

## 1.3 **REFERENCES**

- A. ASTM E84 Standard Test Method for Surface Burning Characteristics for Building Materials.
- B. ASTM C540 Gloss for ceramic materials.
- C. ASTM C614 for alkali resistance.
- D. ASTM D2244 evaluation of color differences.
- E. ASTM B221 Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wires, Profiles and Tubes.
- F. ASTM C208-72 for cellulosic fiberboard.
- G. ANSI A208.1-79 for particleboard.
- H. ANSI H35.1-82 for aluminum temper and alloy.
- I. HNSI A424-80 for steel for porcelain enameling.
- J. FS LLL-B-810 for tempered hardboard.
- K. PEI-1002 Manual and Performance Specification for Porcelain Enamel Writing Surfaces.
- L. BYK-Gardner Surface Distortion.

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- M. GREENGUARD Indoor Air Quality Certified.
- N. GREENGUARD Children and Schools Indoor Air Quality Certified.

## 1.4 QUALITY ASSURANCE

- A Manufacturer: Furnish all dry markerboards and exhibition boards by a single manufacturer for the entire project.
- B. Surface Burning Characteristics: Provide exhibition board surfaces which are identical in composition to those with surface burning characteristics indicated below, as determined by testing in compliance with ASTM E84. Use only exhibition boards which are certified to meet the following standards:
  - 1. Flame Spread: Not more than 25.
  - 2. Smoke Developed: Not more than 40.
- C. Uniformity of color, corrosion, temperature, alkali, water, range of gloss test, uniform texture, light reflectance and cleanability are requirements for all groups and have specific ranges for each.
- D. Product Certifications: Provide GREENGUARD Indoor Air Quality Certified and GREENGUARD Children and Schools Indoor Air Quality Certificates for markerboards.
- E. Reflectivity of LCSII ceramicsteel Markerboard writing surfaces shall not exceed the following:
  - 1. Gloss Range / 60° Gloss meter GU (Gloss Units)
    - a. LCSII ceramicsteel for Markerboard 68 -76% (low gloss surface).
    - b. LCSII ceramicsteel for writing surfaces Surface Distortion reduction and the optimum improvement to performance characteristics.
  - 2. Contrast/waviness for Markerboards (light and dark effects) shall be no greater than 15 [Scale 0 30] when tested with BYK Gardner Wave Scan 5+ Measuring device showing visual acuity (contrast sensitivity) to the human eye at distances greater than 3 meters (10'- 0").
  - 3. Resolution (visual acuity) shall be based on 3 lines per degree and be visibly maintained beyond the current standard of 3 meters. [Byk-Gardner Wave Scan 5+ Measuring device].
  - 4. Surface distortion ("orange peel"/surface peaks and valleys) as tested by the BYK-Gardner Wave Scan 5+ Measuring device [Scale 0 60]. Values are established by the difference in the highpoint/low point of the Markerboard test surfaces. P 3 ceramicsteel shall establish the lowest range of distortion from 11.7 16.02.

### 1.5 SUBMITTALS

- A. Samples and colors for each:
  - 1. Face sheet materials

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- 2. Cork materials
- 3. Vinyl materials
- 4. Aluminum trim types and profiles.
- B. Shop Drawings: Submit shop drawings for each type of drymarker and exhibition board. Include sections of typical trim members and dimensioned elevations. Show anchors, grounds, reinforcement, accessories, layout and installation details.
  - 1. Drawings shall indicate location and actual material lengths of each unit. Room elevations shall indicate joint locations and include dimension from floor and adjacent side walls, cross-sections for trim, backing, face and core materials, fastener spacing and types of units provided.
- C. Product Data: Submit manufacturer's technical data and installation instructions for each material and component part, including data substantiating that materials comply with requirements.
- D. Certification: Submit the manufacturer's certification that materials furnished for the project comply with the specified requirements.
- E. Manufacturer's Product Warranty: Submit manufacturer's product and accessories warranty and certificate of authenticity from manufacturer.
- F. Product use, regular cleaning, stain removal and precautions information in the operation and maintenance instructions.

## 1.6 SPECIAL PRODUCT WARRANTY

- A. Submit a "Life of Building" warranty, stating that under normal usage and maintenance, and when installed in accordance with manufacturer's instructions and recommendations, porcelain enamel steel markerboard writing surfaces are guaranteed for the Life of the Building. Guarantee covers replacement of defective boards, but does not include cost of removal or reinstallation.
- B. Submit a standard warranty, stating that when installed in accordance with manufacturer's instructions and recommendations, exhibition boards are guaranteed for **one (1) year** against defects in materials and workmanship. Guarantee does not cover normal wear and tear, improper handling, any misuse, or any defects caused by vandalism or subsequent abuse. Guarantee covers replacement of defective material, but does not include cost of removal or reinstallation.
- C. Writing Surface Warranty Period: Lifetime of the building commencing on the Date of Substantial Completion.

### PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Basis of Design: "Series 1", as manufactured by Claridge Products and Equipment, Inc.; or approved equal.

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- 1. Finishes and Colors: Shall be selected by the Architect from manufacturer's available full range of finishes and colors including painted aluminum colors.
- B. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
  - 1. Manufacturers of Porcelain Enamel Dry Markerboards and Exhibition Boards:
    - a. Aarco Products Inc.
    - b. Educational Equipment.
    - c. Platinum Visual Systems
    - d. Or approved equal

## 2.2 MARKERBOARD MATERIALS

- A. Porcelain Enamel: Provide balanced, high pressure laminated porcelain enamel markerboards of 3-ply construction consisting of facing sheet, core material and backing.
  - 1. Face Sheet: LCS-II Porcelain Enamel grade cold rolled steel for markerboard, as indicated on drawings..
    - a. <u>Coat the exposed face with a 3-coat process</u> consisting of primer, ground coat and color cover coat, and the <u>concealed face with a 2-coat process</u> consisting of primer and ground coat.
      - 1) Bottom Ground Coat 1.5 to 2.2 mils
      - 2) Top Ground Coat 2.0 to 2.8 mils
      - 3) Top Cover (Color) Coat 3.0 to 4.0 mils
    - b. Fuse cover and ground coats to the steel at the manufacturer's firing temperatures, but not less that 1,200 deg.F (649 °C).
    - c. LCS-II Porcelain Enamel for markerboard with improved writing and erasing surface (3 colors low gloss and 3 colors high gloss)
    - d. Facing sheet construction:
      - 1) 1.7-2.5 mils enameled ground coat on face minimum thickness.
      - 2) 3.0 4.0 mils enameled cover (color) coat for markerboard.
      - 3) 1.7-2.5 mils enameled minimum ground coat on back of facing.
      - 4) Firing temperatures shall be a minimum of 1200°F for LCSII markerboard.
  - 2. Writing Surface Core: 7/16" Medium Density Fiberboard (MDF) composed of approximately 90% post-industrial waste.
    - a. Units over 12'-0" in length and longer will require H-bar at center.
  - 3. Moisture backer shall be factory laminated to core material. A 0.005" thick aluminum backer shall be provided standard on all markerboards.
  - 4. Perimeter trim shall be as indicated on the architectural drawings.
  - 5. Factory Built Trim: Markerboard tray shall be 2-3/4" with 3/4" radius corners and include box tray.
  - 6. Maprail: shall be provided on all markerboards and will be either 1" or 2", as indicated on the architectural drawings/details.
    - a. Cork insert to be Claridge Cork, color as selected by Architect.

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- 7. Accessories (1" or 2"):
  - a. Maphooks (minimum two per 4' maprail).
  - b. Flag holder (one per room).
    - 1) Provide separate wall mount flagholder, as required. Coordinate locations with locations of projection screens.
  - c. Map roller brackets (one pair per markerboard).
  - d. Maprail end stops (one pair per display rail).
- 8. Lamination:
  - a. Factory machine type only.
  - b. Specially formulated adhesives.

# 2.3 EXHIBITION BOARD MATERIALS

- A. Fabricork: #1380 Vinyl fabric on natural cork underlay with Duracore backing.
- B. Thickness: Total laminated thickness of core and covering is 1/2". All thicknesses are nominal.
- C. Vinyl Fabric: 15 oz/In yd.
- D. Lamination: Factory machine type with specially formulated adhesive.
- E. Metal Trim and Accessories: Factory fabricated frames and trim of not less than 0.062" thick aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single length units wherever possible; keep joints to a minimum. Miter corners to a neat, hairline closure. Plastic accessories will not be accepted.

# 2.4 FABRICATION

- A. Assembly: Provide factory assembled dry markerboard and exhibition board units, except where field assembled units are required.
- B. Make joints only where the total length exceeds the maximum manufactured length. Fabricate with the minimum number of joints, balanced around the center of the board, as acceptable to the Architect.
  - 1. Provide the manufacturer's standard vertical joint system between abutting sections of dry markerboard.

# PART 3 - EXECUTION

# 3.1 **PREPARATION**

- A. Field Measurements: Take field measurements prior to the preparation of shop drawings and fabrication where possible, to ensure proper fitting of the work. Allow for trimming and fitting wherever taking of field measurements before fabrication might delay work.
- B. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

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# 3.2 INSTALLATION

- A. Deliver factory-built dry markerboard and exhibition board units completely assembled in one piece without joints, wherever possible. Where dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to the Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.
- B. Install units in locations and at mounting heights indicated and in accordance with the manufacturer's instructions. Keep perimeter lines straight, plumb and level. Provide all grounds, clips, backing materials, adhesives, brackets, anchors, trim and accessories necessary for a complete installation.
  - 1. Anchor all components securely using tamperproof fasteners, where accessible.
  - 2. Install all dry markerboards and exhibition boards with completely concealed continuous hangers.
  - 3. Where wall mount flagholders is required install units where directed by the Architect / Owner.
- C. Provide factory-trained installers.
- D. Apply manufacturers' adhesive behind each board using roughly <sup>1</sup>/<sub>4</sub> cup @ 16" on center.
- E. Mounting heights from the floor for each room shall be as follows:

Consult with the Architect / Owner before start of installation:

- 1. Kindergarten 24"
- 2. First & Second grades 26"
- 3. Third & Fourth grades 28"
- 4. Fifth and Sixth grades 30"
- 5. Seventh ninth grades 33"
- 6. Tenth and up grades 36"
- F. Provide covering for H-moldings to match vinyl-covered boards.
- G. Clean boards using manufacturers' recommended procedures and install cleaning labels for each room.
- H. Locate accessories on each board as specified.
- I. Provide mitered and wrapped hairline joints for all trims.
- J. Provide fasteners at perimeter trims 16" 24" and 12" 16" on trays.

### 3.3 ADJUST AND CLEAN

A. Verify that accessories required for each unit have been properly installed and that operating units function properly.

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- B. Clean units in accordance with the manufacturer's instructions. Break-in markerboards only as recommended by the manufacturer.
- C. Repair or replace all damaged units and surfaces to the approval of the Architect at no additional cost to Owner.

# **END OF SECTION 10100**

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## **SECTION 10440 - SPECIALTY SIGNS**

### 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 DESCRIPTION OF WORK**

- A. Extent of specialty signs is shown on the drawings.
- B. Forms of specialty signs required include the following:
  - 1. Panel signs (Room Identification Signs).
  - 2. Installation of all specialty signs.

### 1.3 QUALITY ASSURANCE

- A. Uniformity of Manufacturer: For each sign form and graphic image process indicated furnish products of a single manufacturer.
- B. All signs shall conform to the International Building Code and ICC/ANSI A117.1. 2017 requirements for accessible building elements.
  - 1. All signs to permanent rooms and spaces shall include Braille in accordance with <u>N.J.A.C.</u> 5:23-7.11 (j).

### 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for each type of sign required.
- B. Samples: Submit samples of each sign form and material showing finishes, colors, surface textures and qualities of manufacturer and design of each sign component including graphics.
  - 1. Submit full-size sample units, if requested by the Architect. Acceptable units may be installed as part of the work.
- C. Shop Drawings: Submit shop drawings for fabrication and erection of specialty signs. Include plans, elevations, and large scale details of sign wording and lettering layout. Show anchorages and accessory items. Furnish location template drawings for items supported or anchored to permanent construction.

# PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

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- 1. Americraft Inc.
- 2. Architectural Graphics Inc.
- 3. ASI Sign Systems, Inc.
- 4. Bayuk Graphic Systems, Inc.
- 5. Brandon Signage Co.
- 6. Designer Sign Company.
- 7. Gemini
- 8. Howard Industries
- 9. Metro Signs.
- 9. Mohawk Sign Systems.
- 10. Or approved equal.

## 2.2 MATERIALS

- A. GENERAL: Provide manufacturer's standard plastic signage which comply with the requirements established in the International Building Code and ICC/ANSI 117.1 2017 Barrier Free Standards. All signs to permanent rooms and spaces shall include Braille in accordance with N.J.A.C. 5:23-7.11 (j).
  - 1. Acrylic sheet material to be cut to the desired sizes with radius or square corners as indicated, or as per approved shop drawings.
  - 2. Manufacturer's standard extruded acrylic material, as indicated, for Barrier Free Accessible signage indicating International Symbol of Accessibility.
  - 3. "Helvetica Regular" letter style, Domed Grade II Braille and other pictograms as described herein.
  - 4. Colors: As selected by the Architect from manufacturer's standards after award of contract, or as specified herein.

# 2.3 FABRICATION

- A. Unframed Panel Signs: Fabricate unframed panel signs with edges mechanically and smoothly finished to conform with the following requirements:
  - 1. Edge Condition: Square cut.
  - 2. Corner Condition: Provide radius corners for each sign type.

### 2.4 SIGNAGE

- A. GENERAL: ALL signage MUST comply with the requirements established in the International Building Code and ICC/ANSI 117.1 2017. All signs to permanent rooms and spaces shall include Braille in accordance with N.J.A.C. 5:23-7.11 (j).
- B. <u>INTERIOR SIGNAGE:</u>
  - 1. <u>Room Names and Numbers Signage:</u>
    - a. Provide Room Name and Numbers plastic signs for all rooms with name and room number, as shown on drawings and schedules.
      - 1) <u>Type "8" Signs Multi-Purpose Room, Stage, Cafeteria, Auditorium,</u> <u>Faculty Dining, Main Offices, Media Center, Kitchen, etc. :</u>

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- a) Provide sand-carved process, 1/8" thick non-combustible, selfextinguishing solid composite plastic with integral tactile letters, numbers and symbols raised a minimum of 1/32" from sign face.
- 2) <u>Informational Signage:</u>
  - a) Provide informational plastic signs at selected doors, as shown on drawings and schedules.
    - i) Signs "THIS IS NOT AN EXIT", "EXIT", etc.:
      - (1) Provide sand-carved process, 1/8" thick noncombustible, self-extinguishing solid composite plastic with integral tactile letters, numbers and symbols raised a minimum of 1/32" from sign face.
- 3) <u>Sizes:</u> As indicated or as directed by the Architect / Owner.
- 4) All room signs shall have radius corners.
- 2. Barrier Free Accessibility Signs and Directional Signage:
  - a. Basis of Design; "Vandal-resistant signs" as manufactured by Americraft Inc.; or approved equal.
    - 1) Provide injection molded process, 1/8" thick acrylic with non-glare clear front surface, graphics and colors on second surface (Back surface), with radius corners and stepped edging. Provide mounting holes with stainless steel screws. Colors to be selected by the Architect from manufacturer's available full range of colors.
    - 2) Provide tactile plastic signs displaying international symbol of accessibility in tactile form and accompanied by Grade II Braille.
    - 3) For Directional Signage, indicate the route to the nearest accessible element.
    - 4) Provide signage at the following locations and as indicated on the Contract Drawings:
      - a) Accessible toilet and bathing units including stalls.
      - b) Accessible building entrances.
      - c) Accessible areas of refuge.
      - d) Accessible means of egress.
- 3. Area Refuge Signage:
  - a. Provide where area refuge is shown on the Contract Drawings. Locate at interior and exterior of doors accessing the area refuge and within the area of refuge.
    - 1) Interior: Provide sand-carved process, 1/8" thick non-combustible, selfextinguishing solid composite plastic with integral tactile letters, numbers and symbols raised a minimum of 1/32" from sign face.
    - 2) Exterior: Provide signage where indicated or required by Code, of silk screened copy, on baked enamel aluminum sheet material 0.063 thick, in two colors on white reflective background, as otherwise required by authorities having jurisdiction.
- 4. <u>Signage Locations:</u>
  - a. Along the door on the latch side and shall be mounted as follows:
    - 1) 48" minimum to the lowest tactile character on the sign measured from the finish floor.
    - 2) 60" maximum to baseline of highest tactile character on the sign measured from the finish floor.

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- b. For locations having double doors, mounting shall be to the right of the right hand door.
- c. Where there is no wall space on the latch side of the door, including double leaf doors, signs shall be placed on the nearest adjacent wall.
- 5. <u>Graphic Content and Style:</u> Provide sign copy to comply with the requirements indicated for sizes, styles, spacing, content, positions, materials, finishes and colors of letters, numbers, symbols and other graphic devices.
  - a. Raised Copy Thickness: Not less than 1/32" from the sign face.
  - b. Raised characters shall be in different color and meets the Barrier Free requirements for a 70% contrast ratio of colors. Colors shall be selected from manufacturer's available full range of colors.
  - c. Raised characters and symbols for tactile signs shall be 5/8" high minimum and 2" high maximum. Sign size shall suit the required letters and numbers.
- 6. <u>Braille Copy:</u> Braille Copy shall be Grade II and shall conform to Specification 800, National Library Service, Library of Congress. Braille shall be <u>raised</u> integral .0625 diameter.
  - a. Braille shall be separated 1/2" minimum from the corresponding raised characters or symbols.
- 7. Mounting: As directed by the Architect using required method.

### PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Locate sign units and accessories where shown or scheduled, using mounting methods of the type described and in compliance with the applicable Codes and regulation.
- B. Install sign units level, plumb and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
- C. Wall Mounted Panel Signs: Attach panel signs to wall surfaces using the method indicated below:
  - 1. Silicone Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous or vinyl-covered surfaces.
    - a. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.

# 3.2 CLEANING AND PROTECTION

A. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

### END OF SECTION 10440

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# SECTION 10800 - TOILET AND BATH ACCESSORIES

## 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 DESCRIPTION OF WORK**

- A. Extent of each type of toilet accessory is indicated on the drawings and schedules.
- B. Type of toilet accessories required includes but are not limited to the following:
  - 1. Mirrors
  - 2. Grab bars
- C. Refer to the Toilet Room Accessories Schedule which identifies items supplied by the Owner and installed by the General Contractor.

### 1.3 QUALITY ASSURANCE

- A. Inserts and Anchorages: Furnish inserts and anchoring devices which must be built into masonry and gypsum drywall; coordinate delivery with other work to avoid delay.
- B. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.
- C. Products: Provide products of same manufacturer for each type of accessory unit and for units exposed in same areas, unless otherwise acceptable to Architect.

# 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for each toilet accessory.
- B. Setting Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices and cut-out requirements in other work.

### 1.5 WARRANTY

- A. Washroom Accessories: Warranty is limited to replacing or repairing, at the manufacturer's option, transportation charges prepaid by the purchaser, any washroom accessory unit or part thereof which their inspection shall show to have been defective within the limitation of the warranty. Period of warranty is measured from the date of their invoice as follows:
  - 1. Complete unit (except mirrors) **One (1) year**.
  - 2. Stainless Steel Mirror Frames Fifteen (15) years against corrosion.
  - 3. Tempered Glass Mirrors Five (5) years against silver spoilage.

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- 4. Polished #8 Architectural Grade Finish on 304 Series Stainless Steel **One (1) year** against corrosion.
- 5. Bright Annealed Finish on 430 Series Stainless Steel **One (1) year** against corrosion.

Note: Warranty does not cover installation labor charges and does not apply to any units which have been damaged by accident, abuse, improper installation, improper maintenance, or altered in any way.

### PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis of Design: Catalog numbers used herein are Bradley Washroom Accessories, or approved equal. Refer to drawings for schedule and additional information. Similar products for other indicated manufacturers will be acceptable.
- B. Subject to compliance with requirements, manufacturers offering toilet accessories which may be incorporated in the work include one of the following:
  - 1. American Specialties, Inc.
  - 2. Bobrick Washroom Equipment, Inc.
  - 3. Or approved equal

### 2.2 MATERIALS, GENERAL

- A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gauge (.034") minimum, unless otherwise indicated.
- B. Brass: Leaded and unleaded, flat products, FS QQ-B-613; Rods, shapes, forgings, and flat products with finished edges, FS QQ-B-626.
- C. Sheet Steel: Cold-rolled, commercial quality ASTM A 366, 20-gauge (.040") minimum, unless otherwise indicated. Surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A 527, G60.
- E. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.
- F. Baked Enamel Finish: Factory-applied, gloss white, baked acrylic enamel coating.
- G. Mirror Glass: ASTM C-1048, Type I, Class 1, Quality q2, 1/4" thick, with silver coating, copper protective coating, and non-metallic paint coating complying with FS DD-M-411. Provide tempered safety glass for all mirrors.
- H. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
- I. Fasteners: Screws, bolts, and other devices of same material as accessory unit or of galvanized steel where concealed.

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# 2.3 **PRODUCT DESCRIPTIONS**

- A. Mirror Units: #780 Series, Mirror plates shall be of No. 1 quality 1/4" polished safety glass, silvered and electrolytically copper backed.
  - 1. Frames shall be 3/4" x 3/4", type 304, 18 gauge satin finish stainless steel angle with mitered corners, welded and polished smooth, with 20 gauge angle stiffeners welded to frame, 20 gauge galvanized steel back with formed edges secured to frame with concealed screws and equipped with integral 18 gauge cold rolled steel all welded construction wall hangers.
  - 2. Mirror units shall guaranteed by the manufacturer for a period of **fifteen (15) years** which starts on approved date of installation.
  - 3. Sizes as indicated on Drawings and schedule.
- B. Grab Bars: (Provide quantity and types indicated)
  - 1. Stainless Steel Type: Provide grab bars with wall thickness not less than 18 (.050") gauge and as follows:
    - a. Mounting: Concealed, manufacturer's standard flanges and anchorages.
    - b. Clearance: 1-1/2" clearance between wall surface and inside face of bar.
    - c. Gripping Surfaces: Manufacturer's non-slip texture.
    - d. Heavy-Duty Size: Outside diameter of 1-1/2".

### 2.4 **FABRICATION**

- A. General: No names or labels are permitted on exposed faces of toilet and bath accessory units. On either the interior surface of the accessory or on the back surface, the manufacturer shall indicate the manufacturer's information, model number on a printed waterproof label or a stamped nameplate attached to the accessory.
- B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.

# PART 3 - EXECUTION

### 3.1 INSPECTION

A. Examine the areas and conditions under which work is to be installed and notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

# 3.2 INSTALLATION

A. Install toilet accessory units in accordance with manufacturers' instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations and at heights indicated.

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B. Use all metal type fasteners such as anchors, plates, screws, bolts and expansion shields, type as required by the construction to which accessories are to be secured. Exposed hardware shall match finish of the accessory.

# 3.3 ADJUSTING AND CLEANING

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
- B. Clean and polish all exposed surfaces after removing temporary labels and protective coatings.

# END OF SECTION 10800

# SECTION 10830 - INFANT CHANGING TABLE

## 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 DESCRIPTION OF WORK**

- A. Extent of type of infant changing table(s) are indicated on the Drawings and schedule.
- B. Type of infant changing tables: Surface mounted horizontal design changing station.
- C. Related Work:
  - 1. Section 04200 Unit Masonry.
  - 2. Section 09250 Gypsum Drywall.

### 1.3 QUALITY ASSURANCE

- A. Inserts and Anchorages: Furnish inserts and anchoring devices which must be built into masonry or metal stud framing; coordinate delivery with other work to avoid delay.
- B. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.
- C. Products: Provide products of same manufacturer for each type of unit and for units exposed in same areas, unless otherwise acceptable to Architect.

# 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for each infant changing table.
- B. Setting Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices and cut-out requirements in other Work.
- C. Warranty: Submit manufacturer's standard warranty on all parts and installation.
  - 1. Unit shall be backed by manufacturer's **five (5) year limited warranty** on materials and workmanship and include a provision for replacement caused by vandalism from date of substantial completion.

# PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Basis of Design: "KB300-00", horizontal surface mounted baby changing station, as manufactured by Koala Care Products; or approved equal.

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- 1. Comparable products of other manufacturers will only be considered if it can be clearly shown that the substituted products are equal to or exceed the construction quality requirements stated in the "Basis of Design" manufacturer's standard product data. Substitution shall be in accordance with AIA A201 and Section 00800.
- B. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
  - 1. Foundations Children's Products,
  - 2. Or approved equal.

### 2.2 MATERIALS, GENERAL

- A. FDA approved blow molded high-density polyethylene with Microban® antimicrobial interior. Reinforced full-length steel-on-steel hinge mechanism, with 11-gauge steel mounting plates and mounting hardware included. Molded in graphics and safety messages in four (4) languages. Contoured changing area and comes complete with nylon safety straps and bag hooks.
- B. Concealed pneumatic cylinder and metal mounting chassis provides controlled, slow opening and closing of bed.
- C. High-density polyethylene is easy to clean and resists odors and bacterial growth.
- D. Complies with ASTM static load performance requirements when properly installed.
- E. Bed shall have smooth concave changing area with a nylon safety strap and two hooks for bags or purses. Unit shall have a built-in liner dispenser for use with 3-ply chemical free biodegradable bed liners.
- F. Unit shall conform to:
  - 1. ICC A117.1-2017, Accessible and Usable Buildings and Facilities,
  - 2. ASTM F 2285-04, Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use,
  - 3. ANSI Z535.4, Product Safety Signs and Labels,
  - 4. EN 12221:2008, ASTM G22 Antibacterial standards or local code if more stringent installation requirements are applicable for Barrier-Free accessibility.
  - 5. Is intended to be compliant with the 2010 ADA Standards for Accessible Design and the 2017 ICC A117.1, Accessible and Usable Buildings and Facilities.
- G. Designed to lift door from open position and brake to prevent the trapping of hands or fingers.
- H. Unit is engineered to withstand loads of up to 200 pounds.
- I. Size: 22-1/4" high, 35-3/16" wide, 4" deep (Closed position).

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- J. Installation in accordance with manufacturer's recommendations / instructions.
- K. Provide Braille label.

## PART 3 - EXECUTION

### 3.1 INSPECTION

A. Examine the areas and conditions under which Work is to be installed and notify the Architect in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

### 3.2 INSTALLATION

- A. Install infant changing table units in accordance with manufacturers' instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations and at heights indicated.
- B. Use all metal type fasteners such as anchors, plates, screws, bolts and expansion shields, type as required by the construction to which accessories are to be secured.

### 3.3 ADJUSTING AND CLEANING

- A. Adjust infant changing table units for proper operation and verify that mechanisms function smoothly. Replace damaged or defective units or accessories.
- B. Clean and polish all exposed surfaces after removing temporary labels and protective coatings.

### END OF SECTION 10830

## SECTION 11000 - GENERAL REQUIREMENTS - CASEWORK AND EQUIPMENT WORK

#### PART 1 - GENERAL

#### 1.1 **RELATED DOCUMENTS**

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Part 1 through Part 6 Specification Sections, apply to this Section.

### **1.2 DESCRIPTION OF WORK**

A. Casework and Equipment Work includes all items listed on schedules. All general requirements of this section apply to all equipment Contracts.

#### 1.3 QUALITY ASSURANCE

- A. Products of individual manufacturers are scheduled to establish type and standard of quality. Products of other manufacturers proposed to be used shall meet the published specifications of the specified product as to materials, finishes, design and fabrication, to the satisfaction of the Architect.
- B. Compatibility: Provide each type of equipment by a single manufacturer, including accessories. It is of the utmost importance that a stability of design and interchangeability of parts and pieces be provided, and it shall be specifically understood that a miscellaneous assortment of equipment assembled by dealers or agents will not be considered as meeting requirements of the specification.
- C. Casework and/or Equipment Work specified herein and other Division 11 specification sections have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.
  - 1. Comparable products of <u>other</u> manufacturers will be considered <u>only</u> if it can be clearly shown that their products are equal to or will exceed the construction quality requirements and other design attributes listed by manufacturers for indicated model numbers.
  - 2. The General Contractor will not award subcontract for Casework or Equipment supplier unless the Architect has approved that supplier's samples, certificates, individual product drawings, and proof of ability to perform.

### 1.4 SUBMITTALS

- A. Submit manufacturer's technical data, catalog cuts and installation instructions for each type of furniture and equipment.
- B. Samples: Submit, for verification purposes, samples of each exposed material from which equipment units and accessories are composed, in each color, finish, pattern and texture indicated. If these qualities are not indicated, submit, for initial selection, manufacturer's color charts or samples of actual materials showing full range of standard colors, finishes, patterns, and textures available. Include samples of the following:

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- 1. Baked enamel finishes for metal components
- 2. Wood and plywood materials and finishes
- 3. Molded plastic and fiberglass
- 4. Exposed fasteners
- C. Submit full-size samples of finished units when complete with hardware, doors, adjustable shelves, etc., when requested by Architect. Acceptable sample units will be used for comparison inspection at project. Unless otherwise directed, acceptable sample units may be incorporated in the work. Notify Architect of their exact locations. If not incorporated in the work, retain acceptable sample units in the building until completion and acceptance of the work. Remove sample units from the premises when directed by Architect.
- D. Shop Drawings
  - 1. Submit shop drawings showing plans, elevations, ends cross-sections. Show details and location of anchorages and fitting to floors, walls and base. Include layout of units with relation to surrounding walls, doors, windows, and other building components.
  - 2. Coordinate shop drawings with other work involved.

# 1.5 **PRODUCT HANDLING**

- A. Deliver casework only after wet operations in building are complete.
- B. Store completed equipment in ventilated place, protected from the weather, with relative humidity therein of 50% or less at 70°F.
- C. Protect sanded and finished surfaces from soiling and damage during handling and installation. Keep covered with polyethylene film or other protective coating.

# 1.6 JOB CONDITIONS

- A. Advise Architect of requirements for maintaining heating, cooling and ventilation in installation areas as required to reach relative humidity necessary to maintain optimum moisture content.
- B. Examination of Substrate and Conditions
  - 1. Field measurements shall be taken to verify that the equipment will fit into the designated space. Entry ways, corridors and door openings shall be verified to ensure that the equipment be manufactured in a matter to permit it to be moved through properly into place.
  - 2. Examine the substrate and the conditions under which the work under this section is to be performed, including condition of substrate to which equipment is to be attached, and notify the Architect, in writing, of unsatisfactory conditions Do not proceed with work under this section until satisfactory conditions have been corrected in an acceptable manner.

# 1.7 QUALIFICATION OF SUPPLIERS OF CASEWORK AND EQUIPMENT

- A. That it owns and operates a factory or factories adequate for and devoted to the manufacture of casework, equipment or material which is proposed to furnish and maintains strict inspection and quality control over the various manufacturing operations performed to produce a satisfactory end product of the standard and quality set forth in the detailed specification.
  - 1. That is at the time of submitting products and equipment and had been engaged in the manufacturing of casework or equipment for a recommended 10 consecutive years and has maintained during this time a published catalog of such specialized equipment, including a line similar to the specified.
  - 2. That the manufacturer or his franchised representative shall have a major installation of equipment delivered and installed over a recommended 10 years conforming to the design and quality specified herein.

# 1.8 VARIATION FROM MATERIALS, PRODUCTS AND EQUIPMENT SPECIFIED

- A. The designs, materials, finishes, functions and upholsteries have been selected by the Owner on the advise of the Architect with intention of creating an integrated building design. For this reason, no variations from the plans, specifications and design guide will be permitted except as noted below.
  - 1. Whenever and wherever in any of the contract documents an article, material or equipment is defined by describing a proprietary product or by using the statement, "as manufactured by", it is the intent that this shall describe by reference the materials desired; craftsmanship and method of manufacture, as well as the size and dimensions rather than detailing all of these requirements herein. It is not the intention to limit the bidding on such items, but merely to indicate that the item must conform to these standards.
  - 2. Any Laboratory Casework manufacturer requesting equivalence must submit test report from a Scientific Equipment and Furniture Association (SEFA) approved independent testing facility showing compliance with SEFA-8 standards. Failure to provide the required information maybe cause for rejection.

# PART 2 - PRODUCTS

2.1 See Schedules on Drawings.

# 2.2 GENERAL REQUIREMENTS (As applicable for each Contract)

- A. BASIS OF DESIGN: CATALOG NUMBERS REFER TO CAMPBELL-RHEA CASEWORK CATALOG, ETC.; OR APPROVED EQUAL, UNLESS OTHERWISE SHOWN, SEE PARAGRAPH 1.2 ABOVE.
- B. ALL CASEWORK DOORS AND DRAWERS TO HAVE LOCKS KEYED ALIKE PER ROOM AND MASTER KEYED.
  - 1. The Contractor shall package keys for each room separately and identify the room number on the package and deliver to the Owner's Representative.

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- C. ALL TOPS SHALL BE 3/4" PLYWOOD WITH SOLID SURFACE COVERING ON ALL EXPOSED SURFACES (UNLESS NOTED OTHERWISE).
- D. ALL BACKSPLASHES SHALL BE SOLID SURFACE SECURED TO THE WALL SURFACE (UNLESS NOTED OTHERWISE).
- E. ALL FURNITURE, CASEWORK AND EQUIPMENT SHOWN DOTTED AND/OR IS INDICATED AS (N.I.C.) IS NOT IN CONTRACT.
- F. UNLESS OTHERWISE SHOWN, THE CASEWORK AND EQUIPMENT WORK SUBCONTRACTOR SHALL SUPPLY AND DELIVER ALL SINKS, TAILPIECES, FAUCETS, AND STRAINERS IN CASEWORK TO THE PLUMBING AND DRAINAGE WORK SUBCONTRACTOR.
  - 1. PLUMBING SUBCONTRACTOR SHALL SUPPLY AND INSTALL ALL TRAPS, VALVES ETC AND SHALL MAKE FINAL CONNECTIONS TO ALL WASTE/VENTS, WATER, ETC., AS REQUIRED, TO MAKE SYSTEMS FULLY FUNCTIONAL.
  - 2. UNLESS OTHERWISE SHOWN, CASEWORK AND EQUIPMENT SUBCONTRACTOR SHALL MAKE SINK CUT-OUTS.
  - 3. SINK CABINETS TO BE INSTALLED BEFORE THE INSTALLATION OF ADJACENT CABINETS.
- G. UNLESS OTHERWISE SHOWN, CASEWORK AND EQUIPMENT WORK SUBCONTRACTOR SHALL SUPPLY AND DELIVER ALL DUPLEX OUTLETS, SWITCHES, AND COVER PLATES ETC., AS REQUIRED, FOR INSTALLATION IN CASEWORK, ETC., TO THE ELECTRICAL WORK SUBCONTRACTOR, READY FOR INSTALLATION AND FINAL CONNECTION BY ELECTRICAL SUBCONTRACTOR.
  - 1. ALL DUPLEX OUTLETS SHALL BE G.F.I.C. UNLESS NOTED OTHERWISE.
- H. ALL CONTRACTORS TO FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION AND NOTIFY ARCHITECT IN WRITTEN FORM OF ANY DISCREPANCIES.
- I. PROVIDE ALL FILLERS, AS REQUIRED. FINISH TO MATCH CASEWORK.
- J. UNLESS OTHERWISE SHOWN, RUBBER BASE ON ALL CASEWORK BY G.C.

### PART 3 - EXECUTION

### 3.1 **PREPARATION**

A. Condition casework and furniture to average prevailing humidity conditions in installation areas prior to installing.

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# 3.2 INSTALLATION

- A. Deliver, uncrate, set in place and install plumb, level, true and straight with no distortions. Shim as required, using concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Before making cutouts, drill pilot holes in corners.
- B. Trim and Moldings: Install in single, unjointed lengths for openings and for runs less than maximum length of lumber available. For longer runs, use only one piece less than maximum length available in any straight run. Stagger joints in adjacent members.
- C. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.
- D. Inspect for dents, scratches, stains, holes, etc. Replace any items showing damage, loose joints or other defects.

### 3.3 CLEANING AND PROTECTION

- A. Clean and polish all items, remove packing cases and debris from the site.
- B. Protection: Perform all procedures and precautions for protection of materials and installed casework from damage by the work of other trades until acceptance of the work by the Owner.
- C. Cover casework with 4-mil polyethylene film for protection against soiling and deterioration during remainder of construction period.

### END OF SECTION 11000

## SECTION 11011 - CASEWORK AND EQUIPMENT

#### PART 1 - GENERAL

#### 1.1 **DESCRIPTION OF WORK**

- A. Section Includes: Wood Casework and related equipment.
  - 1. Pre-manufactured wood casework and equipment, covered by this Specification and accompanying Drawings, are manufactured or supplied by one manufacturer to avoid divided responsibility.
- B. Work included in this section:
  - 1. Furnish all items of equipment as listed in the Specifications, equipment schedule and/or as shown on the Drawings, including delivery to the building, unpacking, setting in place, leveling, and scribing to walls and floors as required.
  - 2. **Furnishing:** Equipment Subcontractor shall make cutouts, holes and openings in countertops so as to be ready for installation of fixtures by the Plumbing Work Subcontractor.
    - a. The Casework and Equipment Subcontractor(s) shall turn over to the Plumbing Subcontractor in a package, all sinks, fixtures, faucets, tailpieces, strainers, etc., and nipples and locknuts, etc., for installation and final connection by the Plumbing Subcontractor.
  - 3. **Furnishing:** Equipment Subcontractor shall make cutouts, holes and openings in countertops so as to be ready for installation of fixtures by the Electrical Work Subcontractor.
    - a. The Casework and Equipment Subcontractor(s) shall turn over to the Electrical Subcontractor in a package, all electrical devices, for installation and final connection by the Electrical Subcontractor.
  - 4. The Casework and Equipment Subcontractor shall provide an itemized lists and a designated site location for the transfer of the above referenced materials to the Plumbing and Electrical Subcontractors. The list shall have a description of the items and quantity along with a sign-off line for the Plumbing and Electrical Subcontractor(s).
    - a. A copy of the signed list is to be submitted to the Architect/Owner prior to billing for this equipment.
  - 5. All debris, dirt and rubbish accumulated as a result of this installation shall be removed and the premises left clean and orderly.
  - 6. All contractors shall familiarize themselves with the job conditions and building measurements in order to coordinate the planning, design, connections, delivery and erection of the fixed casework and related equipment furnished under these specifications with other related and associated work during the term of this contract.
- C. Work included under the work of other contracts:

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- 1. The **connection** of sinks, tailpieces, traps, service lines, drainlines, and piping within the equipment and through, under or along the backs of working surfaces as required by the specifications and/or as shown on the drawing shall be by the Plumbing and Drainage Work Subcontractor in accordance with Part-4 Specifications Sections.
- 2. The <u>connection</u> of electrical receptacles, shall be by the Electrical Work Subcontractor in accordance with Part-6 Specifications Sections.
- 3. The furnishing of any framing or reinforcements for walls, floors, or ceilings to support any equipment, General Construction Work Contractor in accordance with Part-2 Specifications Sections.

### 1.2 QUALITY ASSURANCE

- A. Provide all casework (for integration with tops, sinks and service fixtures, as required) manufactured or furnished by the same company for single responsibility.
- B. Basis of Design: "Campbell Rhea Classic Oak Series", as manufactured by Institutional Casework, Inc.; or approved equal.
- C. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.
  - 1. Comparable products of the following manufacturers will be considered if it can be clearly shown that their products are equal to or will exceed the construction quality requirements and other design attributes listed above.
    - a. Diversified Casework.
    - b. Leonard Peterson Vanguard Line, Lipped.
    - c. TMI Systems Design Corp.
    - d. Or approved equal.
  - 2. The use of one manufacturer's catalog numbers, and the specific requirements set forth in Drawings and Specifications, are not intended to preclude the use of other manufacturer's products or procedures which may be equivalent, but are given for the purpose of establishing a standard of design and quality for materials, construction and workmanship.
  - 3. Substitute products will be considered for substitution only when submitted to the Architect as per the requirements of AIA A201 and Section 00800.
  - 4. Substituted product(s) shall be meet the following minimum requirements:
    - a. All four corners of drawer boxes must be dove-tailed together, and the bottom of all drawer boxes must be let in to the sides, front and back, to be "fully captured." Applied drawer bottoms will not be permitted.
    - b. All drawer front shall be fabricated from solid red oak lumber.
    - c. All cabinet doors shall be framed with solid oak rails on four sides. Tall case doors shall include a lightweight core to reduce stress on hinges. Doors constructed of plywood or particleboard, edge-banded with oak will not be permitted. Tall case doors shall be mounted with (4) hinges.

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- d. All tall case doors shall be complete with three-point latching mechanism. Singlepoint latching will not be permitted.
- 5. The General Contractor <u>will not</u> award subcontract to a wood laboratory casework supplier who is not on the approved list, unless the Architect has approved that supplier's samples, certificates, individual product drawings, and proof of ability to perform.

### 1.3 SUBMITTALS

A. Submit two copies of manufacturer's data and installation instructions for each type of equipment.

### B. Samples:

- 1. Submit one full size sample of finished base cabinet unit complete with hardware, doors and drawers, without finish top.
- 2. Submit one full size sample of finished wall mounted cabinet unit complete with hardware, doors and adjustable shelves.
- 3. Acceptable sample units will be used for comparison inspections at project. Unless otherwise directed, acceptable sample units may be incorporated in the work. Notify Architect of their exact locations. If not incorporated in the work, retain acceptable sample units in the building until completion and acceptance of the work.
- 4. Remove sample units from the premises when directed by the Architect.
- C. Shop Drawings
  - 1. Submit shop drawings showing plans, elevations, ends, cross-sections, service run spaces, locations and type of service fixtures with lines thereto. Show details and location of anchorages and fitting to floors, walls and base. Include layout of units with relation to surrounding walls, doors, windows, and other building components.
  - 2. Coordinate shop drawings with other work involved.

### D. Test Reports - Certifications:

- 1. Submit the following:
  - a. Test reports certifying that the casework finish complies with chemical and other resistance requirements of the specifications.
  - b. Performance test reports from an independent testing lab on each specified top material.

### 1.4 **PRODUCT HANDLING**

A. Deliver casework only after wet operations in building are complete.

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- B. Store completed wood furniture in ventilated place, protected from the weather, with relative humidity therein of 50% or less at 70°F.
- C. Protect sanded and finished surfaces from soiling and damage during handling and installation. Keep covered with polyethylene film or other protective coating.

# 1.5 JOB CONDITIONS

- A. Advise Architect of requirements for maintaining heating, cooling and ventilation in installation areas as required to reach relative humidity necessary to maintain optimum moisture content.
- B. Examination of Substrate and Conditions
  - 1. Field measurements shall be taken to verify that the equipment will fit into the designated space. Entry ways, corridors and door openings shall be verified to ensure that the equipment be manufactured in a matter to permit it to be moved through properly into place.
  - 2. Examine the substrate and the conditions under which the work under this section is to be performed, and notify the Architect, in writing, of unsatisfactory conditions. Do not proceed with work under this section until satisfactory conditions have been corrected in an acceptable manner.

### 1.6 WARRANTY

- A. Manufacturer shall warrant the casework to be free from defects in materials and workmanship, under normal use and service, for **three (3) years** from date of delivery.
  - 1. Within the warranty period, manufacturer shall repair, replace, or refund the purchase price of defective casework.

# PART 2 - PRODUCTS

### 2.1 GENERAL

A. The best cabinet making practices for casework construction shall be followed. All cabinets shall be integral units, each completely enclosed without the use of common partitions unless otherwise specified.

### 2.2 MATERIALS

- A. Lumber:
  - 1. Oak lumber is red oak, grade FAS or better, air dried and kiln dried to a 6 percent moisture content, then tempered to 7-8 percent prior to fabrication. Red oak lumber exposed to view, is free of stains, splits, shakes, season checks and other similar defects.
  - 2. Other hardwoods are grade FAS or better, air dried to a 6 percent moisture content, then tempered to 7-8 percent prior to fabrication. Other hardwoods are used in semi-exposed, or unexposed, areas and comply with NHLA grading for FAS or better lumber.

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- B. Plywood:
  - 1. Oak plywood is red oak, grade A-2, plain sliced, book-matched, crossbanded, and has a solid core.
    - a. 3/4 inch is a minimum of 7-ply.
    - b.  $\frac{1}{2}$  inch is a minimum of 5-ply.
    - c. 1/4 inch is a minimum of 3-ply.
    - d. 3/32 inch is a minimum of 3-ply.
  - 2. Other hardwood plywoods are sound grade, have a solid core and are suitable for semi-exposed or unexposed areas.
    - a. 3/4 inch is a minimum of 7-ply.
    - b.  $\frac{1}{2}$  inch is a minimum of 5-ply.
    - c. 1/4 inch is a minimum of 3-ply.
    - d. 3/32 inch is a minimum of 3-ply.
- C. Hardboard:
  - 1. Hardboard is service tempered and consists of steam-exploded wood fibers, highly compressed into a hard, dense, 1/4 inch thick, homogeneous sheet, using natural resins and other added binders.
  - 2. Physical properties:
    - a. Average modulus of rupture is 5,300 lbs./sq. inch
    - b. Density is 50 to 60 lbs./cu. foot
    - c. Tensile strength of 3,500 lbs./sq. inch.
- D. Particleboard:
  - 1. Particleboard is industrial grade.
  - 2. Physical properties:
    - a. Density, 46 to 50 lbs./cu. ft.
    - b. Modulus of rupture, minimum, 2,200 psi
    - c. Modulus of elasticity, minimum, 450,000 psi.
- E. Service Fixtures:
  - 1. Water, or other services: Triple chrome plated, have heavy-duty construction and are specifically designed for laboratory use.
    - a. Water Faucets Hot and Cold: Faucets are cast from red brass, and have four-arm type handles with color coded indexes. Faucets have serrated hose nozzles. Faucets have patented REX unit ceramic disc cartridges, and replaceable seats. The stem is brass, with full Acme threads, and has a brass cap nut. Goosenecks are rigid. Fixture outlets are tapped 3/8 inch I.P.S. for aerators, vacuum breakers, hose connections, and or other accessories. Provide vacuum breakers.
      - (1) Provide lever handle type faucet control for barrier free applications in accordance with sink notes indicated on drawings.
    - b. **Vacuum Breakers:** Watts NLF-9, or comparable, vacuum breakers are brass with polished chrome plating, screw-in type with stainless steel working parts, and

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durable rubber diaphragm and disc. Vacuum breaker is for hot or cold faucet and has a primary valve with a soft disc that seats against mating part. The secondary check valve utilizes a soft disc to metal seating. Breaker is tapped 3/8 inch N.P.T.

- 2. Electrical Fixtures: Receptacles are 3-wire grounded, 20 A, 125V AC, with stainless steel cover plates and cadmium-plated steel boxes. Pedestal boxes are brushed, cast aluminum with conduit nipples and lock nuts.
  - a. G.F.I. fixtures: 20 A, 125V AC, with a brown nylon face and a LED indicator light. Conform to UL Standard 943 Class A, have hospital grade high abuse receptacle construction, and certified corrosion resistance with cupro-nickel exposed metal parts. Provide terminal screw wiring connections and a trip time of 0.025 seconds.
- 3. Sinks and Sink Outlets:
  - a. **Stainless steel** sinks have a satin finish. They are 18 gauge, type 304, 18-8 stainless steel, with heavily undercoated bottoms and positive pitch drains. Outlets are chrome plated brass. Drain holes are 3-1/2 inch diameter for 4-1/2 inch stainless steel cup strainers. The cup strainer has a neoprene stopper. Provide necessary tail pieces to tie into plumbing roughing, typical.

NOTE: Coordinate with Plumbing Drawings and Specifications.

- G. Tops (See Equipment Schedule):
  - 1. Solid Polymer Fabrications (Solid Surface): Refer to Section 06650.
- H. Hardware and Accessories:
  - 1. Pulls: Shall be selected by the Architect from manufacturer's available standard and custom units at no additional cost to the Owner.
  - 2. Handles:
    - a. Latching handle LH-1 is die cast zinc alloy, 4-1/4 inches long, has a dull chrome plated finish. Handle operates with 1/4 turn. Double door cases have latching handles on the right door and dummy handles on the left door. The rods are 5/16 inch in diameter and move in nylon guides attached to the back of the door. The middle of the door is secured by a latch plate which engages the side of the case, or latches behind the left door on cases with double doors.
    - b. Locking handle LK-1 is a latching handle with a lock mechanism incorporated into the handle head. On double door cases, the left door has a dummy handle, and the right door has the locking handle. Lock is laboratory grade with a 5-disc tumbler mechanism and a dull chrome plated face. Tumblers and keys are brass, while the plug and cylinder are die cast zinc alloy.
  - 3. Locks:
    - a. Lock SL-1 is a laboratory grade, cylinder cam lock, with a 5-disc tumbler mechanism, and a dull chrome plated face. Tumblers and keys are brass, while plug and cylinder are die cast zinc alloy. Lock operates with a 180 degree turn of the key. There are 500 key changes standard. Locks are keyed differently, master keyed and furnished with 2 keys per lock.
    - b. Locks are to be furnished on all doors and drawers.

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- 4. Hinges:
  - a. Hinge CP-1 is heavy duty, institutional type, 5-knuckle hospital tipped, and made from .095 inch thick, chrome plated mild steel. Hinge is wrap around style, and 2-3/4 inches high. The wing for mounting to end panel has 4 holes, two of which are slotted for adjustability; wing for the door has 5 holes, two of which are slotted for adjustability.
  - b. Elbow catch is a steel, spring loaded catch that releases with finger pressure. The catch and steel strike plate are mounted with screws. Strike plate screw holes are slotted for adjustability and pin hole is provided to help anchor its position.
- 5. Drawer Slides:
  - a. Drawer slides DS-1 are electrostatically epoxy powder coated, cold rolled steel, heavy-duty, side mounted, and have a 150 lb. load capacity. They are equipped with heavy-duty, ball bearing nylon rollers for smooth effortless operation. Slides have automatic positive stop levers to prevent accidental drawer removal, but allow quick removal without tools.
  - b. File drawer slides FD-1 are zinc plated, cold rolled steel, heavy-duty, side mounted, and have a 100 lb. load capacity. They are equipped with heavy-duty, ball bearing nylon rollers. Slides are full extension with a positive stop, and a lift out disconnect.
- 6. Shelf Clips:
  - a. Shelf support clips shall be "seismic" twin pin type for mounting on interior of cabinet work. Clips shall be corrosion resistant and shall retain shelves from accidental removal. Shelves in all cabinets are adjustable on 32mm centers.
    - 1) Single pin support clips and surface mounted metal support strips and clips subject to corrosion are not acceptable.

# 2.3 FABRICATION

- A. Factory assembly of casework in the largest components possible aids in the installation. Mortise and tenon construction with glued and screwed joints is used for maximum strength; and the use of precision jigs and clamps ensures square corners and plumb vertical surfaces.
- B. Fabrication of laboratory casework and equipment is completed to dimensions in the final, approved copy of shop drawings.
- C. Base Cabinets:
  - 1. All base cabinets are rigidly constructed, integral units with the strongest most advanced joinery methods utilized of bored, doweled, dadoed, glued and screwed construction. Each base cabinet is completely enclosed without the use of common partitions, and has flush construction with overlapping doors and drawers, which provides a dust resistant interior. A base cabinet has a full horizontal top frame with bored, doweled and glued joints, intermediate front rails and a 3/4 inch plywood bottom; rear horizontal parting rails and separators are provided as required. Horizontal top frame, intermediate parting rails and the bottom are bored, doweled and glued. Separators where indicated, are let into routed intermediate rails. Backs are recessed and encapsulated into dadoed end panels and further secured with glue blocks on each side, except where they need to be removable for access to plumbing. Backs are screwed to the top frame and further

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secured with glue blocks on each side. An enclosed toe space, 2-1/4 inches by 4 inches, is furnished with the toe rail bored, doweled and glued to end panels.

- D. Wall and Upper Cases:
  - 1. All wall and upper cases are rigidly constructed, integral units with the strongest most advanced joinery methods utilized of bored, doweled, dadoed, glued and screwed construction. Each case is completely enclosed without the use of common partitions, and has flush construction with overlapping doors, which provides a dust resistant interior. Top panel is bored, doweled and glued into end panels. Bottom panel is bored, doweled and glued into end panels. Bottom panel is bored, doweled and glued into end panels, and further secured with glue blocks on each side. Exterior hanger rails, at the top of the back, are glued to the back and then screwed to the top panel and bored, doweled and glued into end panels. Exterior hanger rails, at the bottom of the back, are glued to the back and then screwed to the bottom panel and bored, doweled and glued into end panels. Exterior hanger rails, at the bottom of the back, are glued to the back and then screwed to the bottom panel and bored, doweled and glued into end panels. Adjustable shelves are supported on **"seismic" twin pin type** shelf clips, which fit into holes drilled 32 mm on centers, in the case end panels.
- E. Tall Cases:
  - 1. All tall cases are rigidly constructed, integral units with the strongest most advanced joinery methods utilized of bored, doweled, dadoed, glued and screwed construction. Each case is completely enclosed without the use of common partitions, and has flush construction with overlapping doors, which provides a dust resistant interior. Top panel is bored, doweled and glued into end panels. Bottom panel is bored, doweled and glued into end panels. Bottom panel is bored, doweled and glued into end panels. An exterior back cross rail is provided at the top of each case, glued to the back, and then screwed to the top panel and bored, doweled and glued into the end panels. Additional back cross rails are provided, as required. Backs are recessed, let into dadoed end panels, and further secured with glue blocks at the sides. An enclosed toe space, 2-1/4 inches by 4 inches high, is furnished with toe rail securely bored, doweled and glued to end panels and bottom panel.
  - 2. Rails:
    - a. Interior: 2-1/4 inches by 3/4 inch, solid hardwood
    - b. Exterior: 4-1/8 inches by 3/4 inch, solid oak
  - 3. Top panel, bottom panel, dividers, fixed shelf and adjustable shelves:
    - a. Cases with exposed interiors: All are 1 inch oak plywood
    - b. Cases with unexposed interiors: All are 1 inch hardwood plywood.
  - 4. Backs:
    - a. Cases with exposed interiors and exposed exteriors: Back is 1/4 inch oak plywood.
    - b. Cases with unexposed interiors and unexposed exteriors: Back is 1/4 inch service tempered hardboard.
  - 5. End panels:
    - a. Cases with exposed interiors: End panels are 3/4 inch oak plywood.
    - b. Cases with exposed exteriors: end panels are 3/4 inch oak plywood.

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- c. Cases with unexposed interiors and one exposed end panel and one unexposed end panel: Exposed end panel is 3/4 inch oak plywood; unexposed end panel is 3/4 inch hardwood plywood.
- d. Cases with unexposed interiors and unexposed exteriors: end panels are 3/4 inch hardwood plywood.
- 6. Exposed edges of end panels, dividers and shelves are edgebanded with 1/4 inch solid oak.
- 7. Exterior back cross rails: 3 inches by 3/4 inch hardwood plywood.

### F. Drawers:

- 1. Components:
  - a. Drawer front: 13/16 inch oak lumber.
  - b. Drawer sides and back: 1/2 inch hardwood lumber.
  - c. Drawer bottom: 1/4 inch service tempered hardboard.
  - Construction: All four corners of the drawer are dovetailed and glued. Edges of the d. drawer front are machine radiused to form a lip and overlap the opening 1/4 inch on all sides. Drawer fronts are one piece of lumber, providing consistency in color and grain within each drawer front. The back perimeter of the drawer front is routed so drawer front is recessed into the opening and projects 13/32 of an inch. The top edge of drawer sides and back are radiused. The bottom is let into the box on four sides and securely glued underneath with a continuous bead of glue around the perimeter of the drawer bottom. In cabinets 24 inches or less in width, drawers have one, AL-1aluminum pull which is surface mounted with 2 screws, 4 inches on centers. In cabinets over 24 inches wide, drawers have two AL-1 aluminum pulls. Drawers are supported on DS-1 slides which are side mounted, heavy duty, electrostatically epoxy powder coated, cold rolled steel, and have a 150 lb. load capacity. Slides are equipped with heavy-duty, ball bearing nylon rollers for smooth effortless operation. DS-1 slides have automatic, positive stop levers to prevent drawer's accidental removal, but allow for guick removal without tools. File drawers are supported on side mounted FD-1 full extension steel slides. File drawers have an interior, screw mounted, metal bottom track and an adjustable metal file follower. Lock SL-1 is furnished when indicated.

### G. Doors:

- 1. Hinged solid doors, 48 inches or less in height:
  - a. Core ply: Solid oak rails on four edges framing a particleboard core.
  - b. Hardwood plywood crossbands: Four; two laminated on each side of core ply.
  - c. Red oak veneer: Face plys; one applied to each side.
  - d. Construction: Hinged solid doors, 48 inches or less in height, are 13/16 inch thick and have solid oak rails on the four edges. Doors overlap the opening 1/4 inch on all sides and have machined radiused edges. Doors have one aluminum pull which is surface mounted with two screws. Doors have two, CP-1 chrome plated, heavy duty, institutional type, 5-knuckle hospital tipped hinges, each attached with 5 tempered steel screws into solid oak framing of door, and 4 Euro screws into the end panel. Doors are secured by zinc plated steel, friction roller catches, with positive action, spring cushioned, polyethylene roller, and a metal strike plate.

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Catch and steel strike plate are attached with screws. On lockable double door cabinets, the left door is secured with a steel, spring loaded, elbow catch that releases with finger pressure. The catch and the strike plate are attached with screws. Strike plate screw holes are slotted for adjustability and a pin hole is provided to help anchor plate's position. Lock SL-1 is furnished when indicated.

- 2. Hinged solid doors over 48 inches in height:
  - a. Core ply: Solid oak rails on four edges framing a particleboard core.
  - b. Hardwood plywood crossbands: Four; two laminated on each side of core ply.
  - c. Red oak veneer: Face plys; one applied to each side.
  - d. Construction: Hinged solid doors over 48 inches in height, are one inch thick and have solid oak rails on the four edges. Doors overlap opening 1/4 inch on all sides, and machined radiused edges. Single doors and right door of double doors have a LH-1 latching handle, which is 4-1/4 inches long, streamline design, with a dull chrome plated finish. Handle operates with 1/4 turn. Left door of double doors has a fixed handle, which is the same size and finish as a LH-1 latching handle. A three point latching system provides single doors and right door of double doors positive engagement at the top and bottom of the door with tapered aluminum rods which engage plastic strike plates and pull the door snug. The rods are 5/16 inch in diameter and move in nylon guides attached to the back of the door. The middle of the door is secured by a latch plate which engages the side of the case, or latches behind the left door on cases with double doors. Right door of double doors lap over the integral machined astragal on left door, securely holding door shut. Doors have three, CP-1 chrome plated, heavy duty, institutional type, 5knuckle hospital tipped hinges; each attached with 5 tempered steel screws in to solid oak framing of the door, and 4 Euro screws into the end panel. Left door of double doors is additionally secured with two zinc plated steel, friction roller catches, with positive action, spring cushioned, polyethylene roller, and a metal strike plate. Catches and steel strike plates are attached with screws. Catch screw holes are slotted for adjustability, and the strike plate has two nips to help anchor its position. Locking handle LK-1 is furnished when indicated.
- H. Casework Finishes:
  - 1. Surfaces to be Finished: Exposed exterior and exposed interior surfaces of cabinets receive the full finishing process. The unexposed interior surfaces of cupboards, drawers, wall cases, upper cases, and tall cases receive a baked on protective coat of moisture and chemical resistant catalyzed sealer, and a top coat of clear, catalyzed conversion varnish. Other unexposed surfaces are processed through standard finishing steps, and receive a baked on protective coat of moisture and chemical resistant catalyzed sealer.
  - 2. Finishing Process: Prior to assembly lumber for doors, drawers and cabinets, and plywood for cabinets, are machine sanded with 120 grit, 180 grit, and finally, 220 grit sand paper. Flat surfaces receive two additional machine sandings: one in an orbital crossbelt sander with 40 micron and 60 micron grit sanding belts; and, one through a rotary polisher with 150 grit sand paper. Door and drawer front edges are machine sanded to a very smooth surface through a profile edge sander utilizing a 100 grit and a 150 grit paper. After assembly, drawers, doors, and casework are thoroughly examined and fine-finished by hand to provide a consistently smooth surface. Prior to the first application in the finishing process, items are placed in the dust-off booth where

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compressed air is used to remove loose fibers and dust. Selected surfaces are stained with NGR stain to the desired color and allowed to dry. Next a protective coat of moisture and chemical resistant, catalyzed sealer is applied. After flash drying, items are oven baked at 130°F. Following a cool down period, surfaces that receive the final top coat are carefully hand sanded and wiped clean. A top coat of clear, catalyzed, conversion varnish is applied, allowed to dry, and then oven baked at 130°F. The final top coat provides chemical resistance, toughness, durability, and excellent color stability with a smooth finish and high-gloss lustre.

#### **PART 3 - EXECUTION**

#### 3.1 **PREPARATION**

A. Condition casework and furniture to average prevailing humidity conditions in installation areas prior to installing.

#### 3.2 INSTALLATION

- A. Install plumb, level, true and straight with no distortions. Shim as required, using concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Before making cutouts, drill pilot holes at corners. Install wall cabinets in accordance with details on drawings.
- B. Trim and Moldings: Install in single, unjointed lengths for openings and for runs less than maximum length of lumber available. For longer runs, use only one piece less than maximum length available in any straight run. Stagger joints in adjacent members.
- C. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

### 3.3 CLEANING AND PROTECTION

- A. Repair or remove and replace defective work as directed upon completion of installation.
- B. Protection: Perform all procedures and precautions for protection of materials and installed casework from damage by the work of other trades until acceptance of the work by the Owner. Advise HVAC Subcontractor of the required temperature/humidity conditions which must be maintained during the remainder of the construction period.
- C. Cover casework with 4-mil polyethylene film for protection against soiling and deterioration during remainder of construction period.
- D. Clean up cut out pieces, sawdust and debris, packing cases, etc. Leave areas in broom clean condition. Remove all debris as a result of work of this Contract.

#### **END OF SECTION 11011**

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PART 4 - PLUMBING WORK

#### SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENS

A. Drawings, 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. Steel pipe and fittings.
  - 2. Sprinklers.

#### 1.3 DEFINITIONS

A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For wet-pipe sprinkler systems.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include diagrams for power, signal, and control wiring.
- C. Delegated Design Submittals: For wet-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data, signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Coordination Drawings: Sprinkler system plans and sections, or Building Information Model (BIM), drawn to scale, showing the items described in this Section and coordinated with all building trades.
- E. Qualification Data: For qualified Installer and professional engineer.

- F. Design Data: Approved sprinkler piping working plans, prepared according to NFPA 13, including documented approval by authorities having jurisdiction, and including hydraulic calculations if applicable.
- G. Welding certificates.
- H. Field Test Reports:
  - 1. Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
  - 2. Fire-hydrant flow test report.
- I. Field quality-control reports.
- J. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
    - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by qualified professional engineer.
- B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

### 1.6 FIELD CONDITIONS

- A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by the Institution or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
  - 1. Notify the Institution no fewer than two days in advance of proposed interruption of sprinkler service.
  - 2. Do not proceed with interruption of sprinkler service without the District's written permission.

#### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- 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.
- B. Sprinkler system equipment, specialties, accessories, installation, and testing to comply with NFPA 13.
- C. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- D. Delegated Design: Engage a qualified professional engineer to design wet-pipe sprinkler systems.
  - 1. Sprinkler system design shall be approved by authorities having jurisdiction.
    - a. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
    - b. Sprinkler Occupancy Hazard Classifications: Per NFPA 13.
    - c. Minimum Density for Automatic-Sprinkler Piping Design: Per NFPA 13.
    - d. Maximum protection area per sprinkler according to UL listing.
- E. Obtain documented approval of sprinkler system design from authorities having jurisdiction.

#### 2.2 STEEL PIPE AND FITTINGS

- A. Standard-Weight Steel Pipe: Black-steel pipe, ASTM A53/A53M, Type E, Grade B with threaded ends and fittings.
- B. Steel Pipe Nipples: Black steel, ASTM A733, made of ASTM A53/A53M, standard-weight, seamless steel pipe with threaded ends.
- C. Steel Couplings: Uncoated steel, ASTM A865/A865M, threaded.
- D. Gray-Iron Threaded Fittings: Uncoated gray-iron threaded fittings, ASME B16.4, Class 125, standard pattern.
- E. Malleable- or Ductile-Iron Unions: UL 860.

### 2.3 SPRINKLER PIPING SPECIALTIES

- A. Flexible Sprinkler Hose Fittings:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. FlexHead Industries, Inc.

- b. Gateway Tubing, Inc.
- c. Victaulic Company.
- d. Or equal as approved by the Professional.
- 2. Standard: UL 1474.
- 3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
- 4. Pressure Rating: 175-psig minimum.
- 5. Size: Same as connected piping, for sprinkler.

#### 2.4 SPRINKLERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
  - 2. Victaulic Company.
  - 3. Viking Group Inc.
  - 4. Or equal as approved in accordance with the project substitution provisions of the contract.
- B. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- C. Pressure Rating for Automatic Sprinklers: 175-psig minimum.
- D. Automatic Sprinklers with Heat-Responsive Element:
  - 1. Nonresidential Applications: UL 199.
  - 2. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
- E. Sprinkler: Concealed type with brass finish. Provide white cover plate.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.

#### 3.2 INSTALLATION OF PIPING

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
  - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
  - 2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.
- C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- E. Fill sprinkler system piping with water.

### 3.3 JOINT CONSTRUCTION

- A. Install fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

### 3.4 INSTALLATION OF SPRINKLERS

- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.
- B. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.
### 3.5 IDENTIFICATION

- A. Install labeling and pipe markers on piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals.

# 3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.7 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

#### END OF SECTION 211313

### SECTION 220010 - GENERAL REQUIREMENTS PLUMBING

### PART 1 - GENERAL REQUIREMENTS PLUMBING

#### 1.1 GENERAL

- A. The conditions of Divisions 00 and 01 apply to each and every Trade Contractor or other person or persons supplying any material or labor entering this building and/or site, either directly or indirectly. In the event of a conflict between Section 220010 and Divisions 00 and 01, the terms of Divisions 00 and 01 shall govern.
- B. One Building Trade, the Plumbing Building Trade, will be covered by these General Requirements Plumbing.
- C. For simplicity, this Building Trade will be referred to further herein as the Plumbing Trade Contractor. The Plumbing Specifications and all Plumbing Drawings, together with all addenda make-up the Plumbing Contract Documents, and are a part of the "Project Contract Documents", as described throughout these specifications.
- D. The term "Electrical Trade" as used in the Contract Documents, means the Electrical Building Trade.
- E. The term "indicated" means all information included, detailed, shown and/or implied on the Contract Documents.
- F. The term "existing" is used generally in reference to renovation projects. On new construction projects, the term "existing" is intended to mean work already in place.

#### **1.2 SCOPE AND OBJECTIVES OF THE PLUMBING WORK**

- A. Scope of work includes, but is not limited to, the following:
  - 1. Submittals including product data, shop drawings and samples;
  - 2. Removal of selected plumbing fixtures and accessories;
  - 3. Piping, insulation and valves;
  - 4. New plumbing fixtures, piping, insulation and accessories;
  - 5. Preparation of coordination drawings;
  - 6. Preparation of as-built drawings in AutoCad format;
  - 7. Periodic inspection of completed work to confirm compliance with Contract Documents;
  - 8. Refer to Division 01 Section "Summary" for additional information.

#### 1.3 INTENT OF THE PLUMBING CONTRACT DOCUMENT

A. The intent of the Plumbing Contract Documents is to include all items and labor necessary for the proper execution and completion of the Work of the Plumbing Trade Contractor. The Contract Documents of all Trades are complimentary to each other; what is required by one

shall be as binding as if required by all. Performance of the Plumbing Trade Contractor is required only to the extent consistent with the Project Contract Documents and reasonably inferable from them as being necessary to produce the desired results.

B. It is expressly stipulated that neither the Drawings nor the Specifications shall take precedence over the other, and it is further stipulated that the Architect/Engineer may interpret or construe the Drawings and Specifications so as to secure in all cases the result most consistent with the needs and requirements of the work. In the event of such ambiguity or discrepancy, comply with the higher cost product (material plus labor), the more stringent requirement, and supply the better quality or greater quantity of work.

# 1.4 PROPOSAL PREPARATION

- A. Prior to submitting a pricing quotation/proposal, proceed as follows, and include the following:
  - 1. Visit the site, survey, record, confirm and include in the scope of work, all material and labor necessary to install the equipment and systems indicated. Use the Contract Documents as diagrammatic in nature, since they are not intended to show all details which may affect the plumbing bid proposal.
  - 2. Include the work, as applicable, to remove and dispose of plumbing piping, insulation and appurtenances, not required for new work, unless otherwise indicated to be abandoned in place.
  - 3. Include all disconnections, removals and temporary provisions required to permit rigging, installation, connection, testing and operation of the new equipment. Include all such provisions whether or not shown, detailed or specified within technical sections of the Contract Documents.
  - 4. Include in the work, providing the labor of Keymen, including, but not limited to the following:
    - a. One Project Manager;
    - b. One Project Foreman.
  - 5. Foreman must refine the detail, layout, coordination and fit of all of the plumbing piping, fixtures and equipment. Plan all disconnections, removals, offsets, temporary provisions, as required, to fit the new piping, fixtures and equipment into the space, and as required to accommodate maintenance accessibility and service access.
  - 6. Project Manager must maintain and submit for approval, a written project schedule, on a weekly basis.
  - 7. All Project Managers must organize, administrate, control and log the RFI process for their respective trade. Where applicable, submit all RFI(s) for master RFI log maintained by Lead/Prime Contractor.
- B. In preparing a Bid Price:
  - 1. Thoroughly review and confirm all existing conditions and Contract Document information. Make note in writing of any exceptions, misunderstandings, unclear areas, unclear directions, and any aspects which will prohibit completion of the work, in total. Failing to supply such notice, all bidders will be accountable for having accepted all

conditions at the site which affect their work and their costs. By submitting a bid price, all Trade Contractors certify that the Contract Documents have been thoroughly reviewed and are sufficient for construction, and that the bidding Trade Contractors have adequate information to establish and determine their responsibility for materials, methods, costs, and schedule for their work.

- 2. Incorporate all requirements of all sections of the Contract Documents.
- 3. Include the following with the Manufacturer's and Sub-Contractor's Lists:
  - a. The name and telephone number of all Sub-Contractors.

# 1.5 HAZARDOUS MATERIALS

A. The use of asbestos, PCB's or any material or product containing hazardous materials in the performance of this contract is not permitted. Certify, in writing, that no hazardous material or product containing a hazardous material, has been furnished or installed.

### 1.6 DRAWINGS AND SPECIFICATIONS

- A. It is the intent of the specifications and drawings to include under each item all materials, apparatus and labor necessary to properly install, equip, adjust and put into perfect operation the respective portions of the installations specified and to so interconnect the various items or sections of the work as to form a complete and properly operating whole.
- B. Any apparatus, machinery, small items not mentioned in detail which are necessary to complete or perfect any portion of the installation in a substantial manner and in compliance with the requirements stated, implied or intended must be furnished and/or installed without extra cost to the Project. This includes all materials, devices or methods peculiar to the machinery, apparatus or systems furnished and/or installed by the Plumbing Trade Contractor.
- C. In referring to drawings, figured dimensions take precedence over scale measurements. Verify all wall locations, ceiling heights, elevations, dimensions, etc. on the architectural drawings, where applicable. Discrepancies must be referred to the Engineer for decision. Certify and verify all dimensions, routings and layouts in the field and on the coordination drawings before ordering material or commencing work.
- D. Any work called for in the specifications, but not mentioned or shown on the drawings, or called for on the drawings, but not mentioned in the specifications, must be furnished and/or installed as though called for in both.
- E. When any device or part of equipment is herein referred to in the singular number, such as "the pump" such reference is deemed to apply to as many such devices as required to complete the installation.
- F. The term "Provide" means "Furnish and Install". Neither term will be used generally in these specifications, but will be assumed. The term "Furnish" means to obtain and deliver to the job site for installation by other trades.

### 1.7 LAWS, ORDINANCES, REGULATIONS AND PERMITS

- A. The entire plumbing system in all and/or in part must conform to all pertinent laws, ordinances and regulations of all bodies having jurisdiction, notwithstanding anything in these drawings or specifications to the contrary.
- B. Pay all fees and obtain and pay for all permits and inspections required by any authority having jurisdiction in connection with the work under this contract.
- C. Electrical work performed by the Plumbing Trade Contractor must comply with the requirements of the National Electrical Code, NFPA and other boards and departments having local jurisdiction.

### 1.8 TESTS

- A. The following requirements are supplementary to tests specified for individual equipment or systems in other specification sections. Give written notice of date of test in ample time to all concerned.
- B. Concealed or insulated work must remain uncovered until all required tests have been completed; but if construction schedule requires, arrange for partial tests on portions of systems as approved. If a Prime Contractor covers or directs a Sub-Contractor to cover plumbing work prior to completing the required tests, the Prime Contractor is responsible for any additional costs related to completing the required tests.
- C. As soon as conditions permit, conduct preliminary tests of equipment to ascertain compliance with specified requirements. Make needed changes, adjustments and/or replacements as preliminary tests may indicate, prior to acceptance tests.
- D. Conduct pressure, performance and operating tests as specified or required for each system or piece of equipment installed, modified or affected under this contract in presence of the Engineer or Owner as well as a representative of agencies having jurisdiction.
- E. Obtain Certificates of Approval and/or Acceptance as specified or required in compliance with regulations of agencies having jurisdiction. Work will not be deemed complete until such Certificates have been delivered to the Engineer.
- F. Prove conclusively, by testing, that Plumbing systems operate properly, efficiently and quietly in accordance with intent of drawings, specifications and most widely used construction practices.

# 1.9 CLEANING

- A. Be responsible for the following:
  - 1. Removal of all lumber, refuse, metal, piping and debris from site resulting from plumbing work.

2. Cleaning drippings created by the plumbing work, from finished work of other Trades.

# 1.10 GUARANTEE

- A. All material, equipment and workmanship must be in first class operating condition in every respect at time of acceptance by Owner. Acceptance by the Owner will be by letter written to the Plumbing Trade Contractor.
- B. Unconditionally guarantee in writing all materials, equipment and workmanship for a period of one (1) year from date of acceptance by Owner. During the guarantee period, repair or replace, at the Plumbing Trade Contractor's expense, any materials, equipment or workmanship in which defects may develop and provide free service for all equipment and systems involved in the contract during this guarantee period. Beneficial use of any system by the any of the Trade Contractors during construction does not constitute acceptance by the Owner. Time period of this beneficial use cannot be included in the guarantee period.
- C. Guarantee must also include restoration to its original condition of all adjacent work that is disturbed in fulfilling this guarantee.
- D. All such repairs and/or replacements must be made without delay and at the convenience of the Owner.
- E. Guarantees furnished by Trade Contractors and/or equipment manufacturers must be counter-signed by the related Trade Contractor for joint and/or individual responsibility for subject item.
- F. Manufacturers' equipment guarantees or warranties extending beyond the guarantee period described in item B above must be transferred to the Owner along with the Trade Contractor's guarantees.

# 1.11 ENTRANCE OF EQUIPMENT

- A. Determine the method of equipment entrance during initial site visit prior to bidding. Do not scale building openings, door widths, and equipment or component sizes off the drawings. Determine sizes from site measurements and the equipment manufacturer. Include cost of equipment manufacturer's knockdown, use of field assembled equipment, field assembly, all work required for access, removals, replacements, general construction, and the like, as required. During preparation of submittals, verify whether knocked-down or predisassembled equipment have been proposed all to the extent required to permit entry of equipment to final location. Verify that the use of field assembled (not pre-assembled) equipment complies with manufacturer's warranty, guarantee, listings and requirements.
- B. Perform all necessary rigging required for completion of plumbing work.
- C. Deliver products to the site properly identified with names, model numbers, types, grades, compliance labels and other information needed for identification. Deliver products and equipment to the site properly weatherproofed.

- D. The Trade Contractor who furnishes or purchases the product or equipment is responsible to provide and maintain protection from the weather, dust, dirt, construction debris, etc. until the project is complete.
- E. For all products and equipment which, when installed, have an opening into the building must be provided with a plywood cover, or similar protection, to prevent debris, rain, etc. from entering the building. The Trade Contractor who installs the product or equipment is responsible for such protection beginning at the time of installation.

# 1.12 VISIT TO SITE

- A. Due to the nature of the work involved under these Contract Documents, all bidders are recommended to thoroughly examine the site. Coordinate and schedule all site visits with the Owner.
- B. Thoroughly review Contract Documents prior to visiting the site, take Contract Documents to site and thoroughly explore to any extent necessary, the existing conditions as relating to fulfilling the requirements of these Contract Documents.
- C. If discrepancies are noted between requirements of Contract Documents and existing conditions, Trade Contractors must so indicate to Engineer during bidding period and receive clarification before bidding. Failure to comply with this requirement will result in Engineer's interpretation during the construction period such that the Engineer's decision will be final and binding as the sole interpreter of the contract requirements.
- D. Extras will not be considered for any work relating to connections with existing systems or adaptability of new systems to existing structures.
- E. Submission of proposals will be considered evidence that Trade Contractors have complied with the requirements of this Article.

# 1.13 REQUESTS FOR INFORMATION, RFI(s)

- A. Manage RFI(s) in a formal manner. Preparation and submission must comply with the process specified herein to be of maximum benefit to the project. RFI(s) which do not comply with this process will be returned without comment.
- B. All RFI(s):
  - 1. Must be submitted in written form to the party designated at the construction phase kick-off meeting;
  - 2. Must be consecutively numbered, dated, and logged as directed, during the kick-off meeting;
  - 3. Those which are follow-up RFI(s), must use the same RFI number, with a sequential submission number;
  - 4. Must list the RFI number of any reference RFI(s) used in the narrative;

- 5. Must present: background; related drawings; specification articles; room, space locations (as designated on Contract Documents including wing, column line designation, floor designation, and/or north, south, and the like), and must be presented as complete, clearly written thoughts, in legibly printed or typed form;
- 6. Must be completed by the Plumbing Trade Contractor's Designated Project Foreman, under the control and overview of the Plumbing Trade Contractor's Project Manager;
- 7. Must include Plumbing Trade Contractor's Project Foreman's suggested resolution to RFI;
- 8. Must evidence a high level of fluency with the Contract Documents, all job progress correspondence, all Addenda, all Construction Bulletins, and specifically the Plumbing/Electrical Specifications including: Section 210010; the sections of Division 22; Division 23; Division 26; and special system and equipment divisions of the specification Divisions 02 thru 33 inclusive.
- C. The Plumbing Trade Contractor's designated Project Manager must demonstrate familiarity with and responsibility for all RFI(s) prepared by the Project Foreman and must periodically submit an initialed log of RFI(s) signifying control of RFI(s) relating to specification and job scope issues.
- D. Issues relating to job scope, work included, methods and means which are either clearly discernable from the Contract Documents and/or clearly the responsibility of the Plumbing Trade Contractor must be answered by Plumbing Trade Contractor's Project Manager and resolved between the Foreman and Project Manager prior to resorting to written RFI(s). The work of the Project Manager must evidence: fluency with the methods and means anticipated by the Plumbing Trade Contractor during the bid phase to plan and complete the work; fluency with the Contract Documents, and all administrative issues related thereto.
- E. Items or issues which relate to non-compliance to associated codes or regulations must reference code interpretations or the published adopted code or regulation. The reference must be either an excerpt of the code or regulation, published addenda to the code or regulation, a formal interpretation written by a representative of the associated agency, or letter of non-compliance from the Authority Having Jurisdiction. All cited code requirements must include the applicable code title, code version or date, and code section number designation. If the RFI does not contain the required information, the RFI will be returned without comment.

# 1.14 AS-BUILT DRAWINGS

- A. Prepare reproducible (paper) and electronic (cd) record documents in AUTOCAD .dwg format (Version 2000 or later) in accordance with the requirements in Division 01. Use commercial CAD drafting service if Plumbing Trade Contractor does not have CAD capabilities in-house. As an option, if requested by the Plumbing Trade Contractor, an electronic copy (AutoCad .dwg format) of any of the Plumbing Contract Drawings may be provided by the Engineer at a cost of \$250.00, billable to the requesting Contractor. In addition to the requirements specified in Division 01, indicate the following installed conditions:
  - 1. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located

(i.e., traps, strainers, expansion compensators, tanks, and the like). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping, and the like.

- 2. Equipment locations (exposed and concealed), dimensioned from prominent building lines and annotated with permanent equipment number approved by Owner. Include Code and equipment service clearances.
- 3. Approved substitutions, Addenda and Bulletin Contract Modifications, and actual equipment and materials installed

# 1.15 CONTINUITY OF SERVICES

- A. Generally, no actions can be taken by the Plumbing Trade Contractor that will interrupt any of the existing building services for these buildings or any other building until previously arranged and scheduled with the Engineer and Owner.
- B. Should any service be interrupted by the Plumbing Trade Contractor, immediately provide all labor, including overtime if necessary, and all material and equipment necessary for restoration of such service, at no additional cost to the Project.

# 1.16 TEMPORARY FACILITIES, UTILITIES AND HEATING

A. Refer to Division 01 of these specifications.

# 1.17 SMOKE AND FIRESTOPPING (GENERAL)

- A. Furnish and install a material or a combination of materials to form an effective barrier against the spread of flame, smoke and gases, and to maintain the integrity of the "fire and/or smoke" rated construction. Refer to Division 07 of these specifications. Fire and smoke rated construction is identified on the Architectural Drawings. Provide firestopping in the following locations:
  - 1. Pipe and conduit penetrations through above grade floor slabs and through "fire and/or smoke"-rated partitions and fire walls.
  - 2. Penetrations of vertical shafts including, but not limited to pipe chases, duct chases, elevator shafts, and utility chutes.
  - 3. Other locations where indicated or required.
- B. Prepare submittals and submit for approval. Include manufacturer's descriptive data, typical details, installation instructions and the fire/smoke test data and/or report as appropriate for the time rated construction and location. The fire/smoke test data must include a certification by a nationally recognized testing authority that the material has been tested in accordance with ASTM E 814, or UL 1479 fire tests.
- C. Deliver materials in the original unopened packages or containers showing name of the manufacturer and the brand name. Store materials off the ground, and protect from damage

and exposure to elements. Damaged, deteriorated or outdated shelf life materials shall not be used and must be removed from the site.

# 1.18 COORDINATION DRAWINGS

- The HVAC Trade Contractor will initiate preparation of coordination drawings, control original Α. reproducibles, collect, organize and facilitate the work/input of General Construction Trade Contractor and all other building trades, as applicable, relative to the 100% final submission of the coordination drawings. Coordination drawings will be prepared in accordance with Division 01, to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of equipment and materials in relationship with other systems, installations, and building components. Use proposed equipment submittals, which include certified dimensions, service clearances, etc., to assist in preparation of the coordination drawings. If equipment is submitted for review after completion of the coordination drawings and rejected during the submittal review process, because the equipment fails to meet the project specifications, the Trade Contractor is responsible to revise the coordination drawings and layout the work using equipment which meets the project specifications. Trade Contractor will designate all specified return air plenums, locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
  - 1. Proposed locations of piping, ductwork, equipment, and materials. The following shall be included:
    - a. Clearances for installing and maintaining insulation.
    - b. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
    - c. Equipment connections and support details.
    - d. Exterior wall and foundation penetrations.
    - e. Fire-rated wall and floor penetrations.
    - f. Sizes and location of required concrete pads and bases.
    - g. Valve stem movement.
    - h. Service clearance for equipment behind access doors.
    - i. Location of structural columns, beams and supports.
  - 2. Scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
  - 3. Floor plans, elevations, and details to indicate penetrations in floors, walls and ceilings and their relationship to other penetrations and installations.
  - 4. Reflected ceiling plans to coordinate and integrate installation of air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling mounted items.
  - 5. The foregoing information and coordination work must be provided by the applicable Trade Contractor using the coordination drawings as initiated by the Trade Contractor.
  - 6. The Trade Contractor must submit completed coordination drawings for record purposes, not for technical review and approval, but as proof that the coordination

drawings have been completed. The coordination drawings must be completed and submitted for record in advance of submission of sheet metal shop drawings.

B. Coordinate with, and provide the Trade Contractor, all plumbing system and equipment information, locations, and clearances required, to prepare the coordination drawings.

#### 1.19 TRADE CONTRACTOR'S CERTIFICATION

A. Upon final completion of all work, each Trade Contractor must provide a notarized letter on Corporate letterhead, executed by a Corporate Officer, or Company Partner, stating that the work has been completed in accordance with the Contract Documents, Addenda, Bulletins, Trade Contractor's Punch List items and Architect's/Engineer's Construction Observation Report(s). Final Payment will not be approved until the notarized letter has been provided. Refer to the following sample letter.

<u>SA</u>	MPLE LETTER
ENGINEER/ARCHITECT	
TRADE CONTRACTOR	
PROJECT	NO
I hereby certify that all work under the Contract Documents, as applicable, in Construction Observation Reports, has of the work has been performed in acc	HVAC, Plumbing, Fire Protection and Electrical cluding all addenda, bulletins, Punch List items and s been completed and the quality and workmanship cordance with Contract Documents.
	State of:
	County of:
Trade Contractor:	Subscribed and Sworn to before me this day of 20
	Notary Public:
By: Date:	My Commission Expires:

### 1.20 CONNECTIONS TO EXISTING SYSTEMS

- A. Work under this contract may require connections to existing domestic water systems. Include in the bid, all material and labor necessary to perform the following work:
  - 1. Drain the system to level necessary to complete the work;
  - 2. Fill the system to original fill pressure while venting excess air from the system.

#### PART 2 - PRODUCTS

### 2.1 MANUFACTURER'S AND SUB-CONTRACTORS LIST, KEYMEN RESUMES

- A. Before ordering any material or equipment unit, and not later than ten (10) working days after signing of contracts, submit a list of Manufacturers, Sub-Contractors and Suppliers showing make, type, manufacturer's name and trade designation of all materials, and equipment, proposed for use under this contract. Prepare list by reference to specifications. Identify all long lead submittals which will require an expedited submittal review.
- B. Refer to the Article "Proposal Preparation," in this section. Specifically designate the labor force required of the Plumbing Trade Contractor. As part of the mobilization phase of the work, submit resumes for each Keyman including the Project Manager and Project Foreman.
- C. These lists, when approved, will be supplementary to specifications, and no variations therefrom will be permitted except with the approval of the Engineer.
- D. Prepare the list using the "PROPOSED MANUFACTURERS AND SUB-CONTRACTORS LIST" located at the end of this section.
- E. Submittals will not be processed until the requirements of this Article are satisfactorily completed.

### 2.2 SUBMITTALS

- A. Provide digital submissions (.pdf format) for all material and equipment as noted in Proposed Manufacturer's and Sub-Contractors List, except where indicated otherwise herein.
  - 1. Prior to submission of product data, shop drawings, and samples, notify the Engineer/Architect of any site conditions differing from those indicated or specified.
  - 2. Prior to submission of product data, shop drawings and samples to the design professional, the Plumbing Trade Contractor shall submit all submittals which require electrical power to the Project Electrical Trade Contractor for the Plumbing Trade Contractor's and Electrical Trade Contractor's coordination and review. Electrical Trade Contractor shall provide approval of electrical power requirements for the Plumbing Trade Contractor's proposed equipment.
  - 3. All submittals of equipment requiring electrical power must be accompanied by the "PLUMBING AND ELECTRICAL CONTRACTORS' COORDINATION OF PLUMBING

EQUIPMENT ELECTRICAL REQUIREMENTS TRANSMITTAL COVER SHEET" located at the end of this section. Submittals without this Cover Sheet or an incomplete Cover Sheet will be rejected without review.

- 4. All submittals must be accompanied by the "PLUMBING CONTRACTOR'S TRANSMITTAL COVER SHEET" located at the end of this section. Submittals without this cover sheet or with an incomplete cover sheet, will be rejected without review.
- 5. All submittals must be accompanied by the "PLUMBING SUBMITTAL LOG", located at the end of this section. Submit log after final acceptance of the proposed Manufacturer's and Sub-Contractor's list. Revise and update the log with each submittal. Submittals without these logs or without an updated log will be rejected without review.
- 6. Specifically annotate and sign all exceptions, deletions and additions that vary from the Project Contract Documents. Failing to provide signed annotations for all deletions and additions, recognize and accept that Contract Documents will govern, and will be used to resolve disputes.
- B. Prepare submittals by careful reference to: drawings and specifications; preparatory layout of all work; coordination with all proposed equipment; coordination with related submittals and the work of all other Trade Contractors; space requirements; and TYPE A, TYPE B, TYPE C, and TYPE D Utilities defined in this Section. A review of such submittals by the Engineer/Architect, which include drawings, schedules, and catalog cuts provided by the Trade Contractors, their Sub-Contractors, manufacturers, and vendors, shall not relieve the Trade Contractors from the responsibility for correcting all errors of any sort in the submittals, either identified or undetected by such review.
- C. Regularly provide and update submittal log sheets listing submittal number, product, applicable specification section, dates of submittal and receipt and status. Identify each submittal by Job Name, log number and reference to applicable Specification Article number.
- D. Review Time:
  - 1. Allow two (2) weeks after Engineer's receipt for the Engineer's processing of each submittal, exclusive of Owner's, or other's review in the processing chain. Allow a longer time period where processing must be delayed for coordination with subsequent submittals.
- E. The Engineer's recommendation of acceptance of the equipment proposed by the Plumbing Trade Contractor is conditional upon the Plumbing Trade Contractor fulfilling all obligations of the Contract Documents. By furnishing the proposed equipment, the Plumbing Trade Contractor acknowledges compliance with all of the following:
  - 1. Field layout is completed and planning of proposed equipment has coordinated with all related submittals, related trades and space requirements.
  - 2. The Plumbing Trade Contractor has reviewed and approved all submittals prior to submission. Provide all submittals with a signed approval stamp, signifying the following: 1) all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data have been verified; 2) the Engineer/Architect has been notified of all site conditions which affect the work, and which require design resolution,

as opposed to resolution by trade decisions; 3) all items are approved by the Plumbing Trade Contractor, and have been coordinated and checked with other applicable submittals, and contract requirements; 4) submission is clearly marked to indicate which manufacturer's options are provided and which are not provided for the proposed equipment; and 5) manufacturers and/or equipment suppliers have been given a set of the contract documents for their review and use as the basis of the submittals.

- 3. Any and all exceptions requested by the Plumbing Trade Contractor are provided in writing with the submittals. All exceptions, deletions and additions that vary from the Contract Documents have been specifically annotated and initialed. Failing to provide initialed annotations for all deletions and additions, the Plumbing Trade Contractor accepts the condition that the Contract Documents will govern, and will be used to resolve disputes.
- 4. Submittals without the Plumbing Trade Contractor's signed stamp of approval will be returned without review. Initialed approval stamps are not acceptable.
- 5. The Engineer's acceptance of the proposed equipment constitutes the Engineer's formal approval that the engineering performance and operational utility requirements, of the proposed equipment, match the Engineer's specified and designed performance requirements. By entering into these Contracts, the Trade Contractors agree that the purpose of submittals is to demonstrate to the Engineer that the Trade Contractors understand the design concept and that they demonstrate their understanding by indicating which materials and equipment they intends to furnish, install and use.
- F. Secure submittals smaller than 8-1/2 x 11 to paper of this size.
- G. Material and equipment fabricated, furnished and/or installed or used without the Engineer's review are subject to rejection by the Engineer.
- H. Corrections or comments made on submittals during review by the Engineer do not relieve the Plumbing Trade Contractor from compliance with the requirements of the Contract Documents. Such review will be only for general conformance with the design concept, and the information given in the Contract Documents and does not include review of quantities, dimensions, sizing, pressure drops, weights or gauges, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the Plumbing Trade Contractor. Review of a specific item does not indicate acceptance of an assembly of which the item is a component. The Engineer is not responsible for any deviations from the Contract Documents that are not clearly noted by the Plumbing Trade Contractor. The Engineer will not review partial submissions or those for which submissions for correlated items have not been received. The Plumbing Trade Contractor is responsible for: confirming and correlating all quantities, clearance, and dimensions; selecting fabrication processes and techniques of construction; coordinating work with all other Trades, and performing his work in a safe and satisfactory manner.
- I. All submittals must be able to be reproduced. The Plumbing Trade Contractor is responsible for all reproduction and distribution to the General Construction Trade Contractor and all other Trade Contractors as applicable.
- J. If requested for the Plumbing Trade Contractor's use in the preparation of submittals, an electronic copy (AutoCad .dwg format) of any of the Plumbing Contract Drawings may be

provided by the Engineer, after receipt of a signed indemnification agreement, at a cost of \$250.00, billable to the Plumbing Trade Contractor.

K. For additional requirements regarding submittals, refer to Article "Additional Trade Contractor Paid fees and Expenses" in Part 3 of this section.

### 2.3 MATERIALS AND EQUIPMENT

- A. All materials and equipment must be new and conform to the grade, quality and standards specified herein.
- B. All equipment offered under these specifications is limited to products regularly produced and recommended for service ratings in accordance with engineering data or other comprehensive literature made available to the public and in effect at the time of opening of bids. Testing agency seals, decals and/or nameplate shall be attached to and visible on all equipment.
- C. Items such as valves, motors, starting equipment, vibration isolating devices, and all other equipment and material, where applicable and practicable, must each be of one manufacturer.
- D. Install equipment in strict accordance with manufacturer's instructions for type and capacity of each piece of equipment used. Obtain these instructions, which will be considered part of these specifications. Type, capacity and application of equipment must be suitable and operate satisfactorily for the purpose intended in the plumbing systems.

#### 2.4 EQUIPMENT VARIATIONS AND SUBSTITUTIONS

- A. Equipment Substitution Definition as follows:
  - 1. A product that is neither the Basis of Design, nor one of the named Alternative Manufacturing Sources.
  - 2. Unless noted otherwise in the Contract Documents, substitutions may be considered after the award of Contracts. Subsequent requests will be considered only when, through no fault of the Plumbing Trade Contractor, none of the specified products are available.
- B. Equipment Variation Definition as follows:
  - 1. A product that is not the Basis of Design, but is named as one of the specified Alternative Manufacturing Sources.
- C. The manufacturers listed in Part 2 of all technical specifications are considered Alternative Manufacturing Sources as described in Paragraphs A and B above.
- D. "Subject to compliance", as used in these specifications, means compliance with all the requirements of the Contract Documents.

- E. The materials and products mentioned in these Contract Documents are specified to establish a standard of: material of manufacture; independent testing agency certifications; quality; function; design; and performance. The phrases "Basis of Design," "standard of design," and "equivalent acceptable," are used to indicate that other similar, comparable products may be used provided such substitutes or variations are accepted by the Engineer as meeting all the salient characteristics and standards necessary, such as: material of manufacture; independent testing agency certifications; quality; function; design; and performance, to meet the Owner's needs and meet the objectives of the Engineer's Project Design.
- F. Where Alternative Manufacturer Sources are listed for an item:
  - 1. Selection must be either the Basis of Design or one of those listed Alternative Manufacturing Sources.
  - 2. There is no guarantee implied that each and every manufacturer listed can meet or exceed the salient characteristics, such as: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as Basis of Design.
- G. Each Trade Contractor is responsible to contact his proposed equipment manufacturer's representative and confirm, prior to preparing submittals, the proposed manufacturer's product meets or exceeds the: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design. Final acceptance will be determined by the Engineer, whose decision is final.
- H. Submittals offered as an Equipment Variation from the Basis of Design shall include a letter, on the product manufacturer's letterhead, certifying that the proposed product is a Comparable Product to the product specified as the Basis of Design and conforms to all the salient characteristics, including: material of manufacture; quality; function; design; and performance of the product specified as the Basis of Design. If directed by the Engineer for Products offered as an Equipment Variation, the Offerer shall provide a Letter of Confirmation from a Registered, Professional Engineer attesting that the Proposed Equipment Variation conforms to all the salient characteristics, including: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design.
- I. Specific products specified without use of the term: equal; equivalent; comparable product; substitution; or similar term; constitute a proprietary specification, and must be provided as specified, unless a written request is submitted to the Engineer for approval up to ten (10) days after the date of project award. Such requests must include a complete description of the proposed product, along with sufficient documentation and other information necessary for a complete evaluation of the proposed product. Such Trade Contractor Requests shall include a letter, on the product manufacturer's letterhead, certifying that the proposed product is a Comparable Product and conforms to all the salient characteristics, including: material of manufacture; independent testing agency certifications; quality; function, design; and performance of the specified product. If approved, the proposed product will be listed in an addendum to notify all bidders that such acceptance has been granted by the Engineer. If not approved, provide the specified product.

- J. Provide Calculations, signed and sealed by a Professional Engineer registered in the State in which the work is taking place, engaged by the Plumbing Trade Contractor, confirming that the equipment proposed as either a Substitution, or Variation, is a Comparable Product to the product specified as the Basis of Design and conforms to all the salient characteristics, including: material of manufacturer; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design. Provide such calculations for major pieces of equipment (water heaters, medical gas equipment, fire pumps, etc.). The Engineer, whose decision will be final, will determine which products will require calculations during the submittal review process.
- K. The Contract Documents have been founded upon Engineering Design selection of materials, products, and pieces of equipment listed at the Basis of Design. In the event that the incorporation of an approved Substitution, Variation, or assembly, into the work, requires revisions or additions to the contractual requirements of either the Trade Contractor proposing the substitution or variation, or any other Trade Contractor, the Trade Contractor proposing the substitution or variation, shall bear the cost of: such revisions or additions to the work of the Trade Contractor proposing such Substitution and/or Variation; any expenses of all affected trades; and all engineering or architectural services required at no change in the contract sum.
- L. The equipment specifications indicated on the drawings, or in Part 2 of each of the technical specifications, may or may not indicate or include all of the required salient characteristics, components and accessories included with the specified product. Include cost for all such characteristics, components and accessories required to meet or exceed the: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design.
- M. For requirements regarding equipment variations after bid award, refer to Article "Additional Trade Contractor Paid Fees and Expenses" in Part 3 of this section.
- N. Each Trade Contractor negotiating for pricing advantages affecting the Trade Contractor's Bid shall comply with the directives included herein, bear full responsibility for the accuracy and completeness of the submissions required of the Vendor selected by the Trade Contractor. The Proposing Trade Contractor shall bear full responsibility for all extra costs of the Engineer shown to have resulted from inaccurate, and/or incomplete compliance with the directives included in this Specification Article.
- O. All decisions provided by the Engineer, described herein, shall be final.

# 2.5 INSERTS, HANGER SUPPORTS, CLAMPS, FASTENINGS

A. All materials, designs and types of inserts, hanger supports and clamps must meet the requirements of the latest edition of the Manufacturers Standardization Society Document MSS-SP-58, Underwriters Laboratories, Inc., National Electrical Code and Factory Mutual Engineering Division Standards where applicable. Insert, hanger support and clamp types referenced herein are shown in MSS-SP-58.

- B. Provide all necessary inserts, hanger supports, fastenings, clamps and attachments necessary for support of the plumbing work. Select the types of all inserts, hanger supports, fastenings, clamps and attachments to suit both new and existing building construction conditions specifically for the purposes intended.
- C. Clamps and attachments to steel beams and bar joists must be made using types 20, 21, 23, 25, 27, 28, 29 or 30 as applicable to suit conditions of construction. Clamps and attachments must be selected on the basis of the required load to be supported. Provide all necessary steel angle iron or channel between bar joists, or steel beams where direct attachment cannot be made. Holes are not permitted to be drilled or burned in structural building steel for hanger rod supports. Welding of hangers or supports to structural steel is prohibited unless approved beforehand by the Structural Engineer.
- D. Provided for all pre-cast concrete, masonry and cast concrete construction. Locate in pre-cast and cast-in-place concrete as directed by the Structural Engineer. Anchor Basis of Design: Dynabolt, Ram-In and/or Tru-Bolt masonry anchors as manufactured by Ramset. Select and install as recommended by the anchor manufacturer for the various applications, stresses and services involved. Comparable products by Redhead, Hilti or Wej-It may be submitted for review. Installation of masonry anchors must be accomplished by pre-drilling concrete or masonry to diameters and depths required to properly accommodate anchor bolts.
- E. Toggle bolts may be used in dry wall and lath and block plaster walls. The use of toggle bolts is restricted to the weight limitations imposed by the toggle bolt manufacturer for the size used.
- F. Except where noted otherwise herein, attachment to wood or material of similar fibrous nature must be made with lag screws and/or wood screws of required size.
- G. Screws with wooden or plastic plugs, or lead anchors are not acceptable.

# 2.6 PIPING AND CONDUIT SLEEVES

- A. Provide all sleeves required for plumbing work and be fully responsible for the final and permanent locations thereof.
- B. Provide sleeves in the following locations:
  - 1. All pipes and conduits passing through all cast-in-place concrete construction and masonry walls.
  - 2. All pipes and conduits passing through cast-in-place waterproof concrete construction and waterproof masonry walls.
- C. Extend through construction and finish flush with each surface except where noted otherwise. Provide for a minimum ½" clearance around conduit, pipe or its covering in the instance of pipe covered with insulation.
- D. All sleeves in waterproof walls and floors must be fitted and sealed with positive hydrostatic mechanical seals. Provide Basis of Design Product "Link Seal" as manufactured by Thunderline Corporation or Comparable Product by Advance Products and Systems, Inc. or Proco Products,

Inc. Sleeves must be sized accordingly. Mechanical seals must be placed around piping and/or conduit and inserted into void between inner wall of sleeve and piping and/or conduit. Tighten mechanical seals as required for watertight seal.

- E. All sleeves must be Schedule 40 steel pipe finished with smooth edges. Sleeves in waterproof walls and floors must be fabricated with minimum 1/4" thick rectangular steel plate placed around mid-point of sleeve, continuously welded to sleeve and then place the entire/plate assembly into proper position prior to erection of walls and floors. Otherwise, provide sleeves with a minimum of three (3) lugs for anchoring.
- F. Pack voids between sleeves, piping or conduit, where located in fire or smoke rated assemblies, in accordance with UL Fire Resistance Directory.
- G. Set all sleeves prior to or during erection of walls and floors. In the event that sleeves are omitted or incorrectly located in new walls or slabs, submit a location plan and method of cutting and installing sleeves to the Engineer for review prior to carrying out the work.
- H. If sleeves are omitted or located incorrectly, the particular Trade Contractor who is at fault, at no additional cost to the project, must engage the trade which originally installed the work, to cut and patch to the satisfaction of the Engineer.
- I. Provide mechanical seals and insert into voids between piping and conduits that pass through floors, and which will be exposed in finished areas that have floor drains, including spaces classified as "Janitors Closets," "Toilet Rooms," and the like.
- J. Where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine, such as a masonry saw or core drill, to insure a neat hole.

#### PART 3 - EXECUTION

#### 3.1 METHOD OF PROCEDURE

- A. The drawings accompanying these specifications are diagrammatic and intended to cover the approximate and relative locations of the building systems.
- B. Installation, connection and interconnection of all components of these systems must be complete and made in accordance with the manufacturers' instructions and best trade practices.
- C. Erect all parts of equipment furnished at such time and in such manner as not to delay or interfere with other Trade Contractors and their work.
- D. Plug all piping, conduit and ductwork as required during construction to prevent entering of dirt.

- E. Before material is ordered or fabricated, or any work is performed, verify all calculations, sizing, measurements, including lines, grades, pipes and conduit elevations at the building, as applicable, and be responsible for the correctness thereof. No extra compensation will be allowed on account of differences between actual dimensions, routing and measurements and those indicated in the Contract Documents. Any discrepancies discovered must be submitted to the Engineer for consideration before proceeding with the work.
- F. Lay out work and be responsible for the establishment of heights, grades, and the like, for all interior and exterior equipment and systems as applicable, including piping, drains, fixtures, conduit, and the like, included in Contract Documents, in strict accordance with the intent expressed thereby; and all the physical conditions to be met at the building and finished grade, and be responsible for accuracy thereof. The establishment of the location of all work must be performed in consideration of the finished work. In case of conflict, equipment and/or materials must be relocated without cost to the Project, as directed by the Engineer, regardless of which equipment was installed first. Refer to Article, "Coordination Drawings", in Part 1 of this section.
- G. Cooperate with other Trade Contractors for the proper securing and anchoring of all work included within these specifications. Use extraordinary care in the erection and installation of all equipment and materials to avoid marring surfaces of the work of other Trade Contractors, as each Trade Contractor will be held financially responsible for all such injury caused by the lack of precaution and due to negligence on the part of the Trade Contractor's work force.
- H. Do not run pipe or conduit in any concrete slab three inches (3") or less in thickness. Do not place any pipe or conduit in any slab where the outside diameter of the pipe or conduit is more than one-quarter the thickness of the slab. The sweep of pipe or conduit elbows emerging through concrete slabs must not create any hazard or obstructions.
- I. All piping, conduit and other materials and equipment shown to be mounted below ceilings are to be kept as close to ceiling areas as possible unless otherwise noted.
- J. Install and arrange all equipment, such as valves, air vents, cleanouts, traps and the like, which will be concealed in construction, to be fully accessible for adjustment, service and maintenance. Furnish access doors where required for installation under the General Construction Contract, where applicable. Otherwise, furnish and install all required access doors.

# **3.2 PROTECTION OF WORK**

- A. Provide all piping, equipment, materials and accessories having polished or plated surfaces, machined finishes or unpainted surfaces with a thick coat of a neutral protection grease and carefully cover with thick cloth or heavy building paper held securely in place to protect the finish against damage during the entire period of construction. Protect equipment by the use of canvas tarps, vinyl sheeting or similar materials held securely in place.
- B. Seal all openings in pipes, fittings, conduit and all other materials to exclude dirt, sand, and other foreign materials.

C. Exercise every precaution to exclude dust, dirt and all other foreign materials from switchgear rooms, transformers, and all mechanical equipment rooms during construction. Rooms and equipment contained therein must be swept and vacuum cleaned at regular intervals. All relays, meters and plumbing equipment containing electrical components must be protected with heavy paper held in place with approved mastic tape to exclude fine dust and particles. Install and maintain sufficient electric heaters in equipment rooms and transformer compartments to keep equipment dry during construction.

### 3.3 CUTTING AND PATCHING

1. Each Trade Contractor is responsible for their own cutting and patching.

### 3.4 SUPPORTS

- A. Except where noted otherwise in the specifications and shown on drawings, provide all materials, including, but not limited to, equipment supports, supplies and labor necessary as required to adequately support, brace and strengthen new and/or existing equipment and materials installed under/or affected by the plumbing work.
- B. The design, materials, fabrication and erection of structural steel supports must conform to "Specification for Design, Fabrication and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction, "Code of Standard Practice for Steel Buildings and Bridges". Welding, where required, must conform to "Code of Arc and Gas Welding in Building Construction" of the American Welding Society.

#### 3.5 ESCUTCHEONS

- A. Except as noted otherwise, provide heavy solid pattern, steel, cast iron or malleable iron escutcheons with set screws and prime coat of paint on all uninsulated piping and conduit exposed to view within structure where passing through floors, partitions, walls or ceilings. Escutcheons are not required in equipment rooms, boiler rooms or other unfinished areas.
- B. For piping with sleeves extending above floor, provide escutcheons with deep recesses.
- C. Provide solid pattern, smooth chrome plated cast brass escutcheons for all chrome plated pipe fixture connections.
- D. Provide nickel plated cast iron escutcheons where pipes pass through toilet rooms, walls or ceilings.

#### 3.6 PAINTING AND FINISHING

A. All painting, generally, will be provided by the General Construction Trade Contractor, where applicable, except where specifically noted otherwise in the Plumbing Specifications. Otherwise, all Trade Contractors are responsible for their own painting and finishing.

B. Equipment and material furnished with factory enamel finish will not be painted unless finish has been damaged, in which case the equipment or material must be refinished by the Trade Contractor who furnished it, to the satisfaction of the Engineer.

# 3.7 PIPING AND CONDUIT UNDER FLOORS

- A. Wherever piping, conduit or piping enclosures are run under a floor slab on grade, the work is to be installed after the General Construction Trade Contractor, where applicable, has brought the sub-grade to the proper level.
- B. Excavate and backfill as required for the installation of plumbing work. The excavation of the sub-grade where required for the installation of the work must be performed, including that for piping, conduit and piping enclosures, by the Plumbing Trade Contractor. When the installation is completed and satisfactorily tested, the remaining space shall be filled with crushed stone or other material similar to that to be used by the General Construction Trade Contractor, where applicable, for the sub-base. The backfill must be stabilized by hand or pneumatic tamping as directed by the Engineer and must be returned to the original sub-grade level.
- C. No piping, conduit or piping enclosures is to be installed in the stone sub-base which is part of the General Construction Trade Contractor's work, where applicable, unless specific permission is granted by the Engineer.
- D. Where piping is noted to be installed in enclosures, such as split terra cotta pipe, necessary protection of the insulation, arrangement and installation will be as hereinafter described in the detailed technical specifications.
- E. Where required by drawing notes, specifications, or applicable electrical codes, conduits installed under floors must be encased in concrete, conforming to the Division 03 specifications.

# 3.8 ABANDONMENT, REMOVAL AND RELOCATION

- A. Removals shown on drawings are a general indication only, and may not necessarily indicate the full extent of removals which may be required to complete this work.
- B. Where existing partitions, walls, ceilings and floors are to be removed, all piping, conduits, materials, fixtures and equipment attached or fastened thereto or within, as applicable, must be carefully removed.
- C. Where work under this contract interferes with the existing construction, ductwork, piping, conduit or equipment, remove all such materials and route new work to clear the obstruction. Provide additional piping, conduits and material of the same design and quality if the piping and/or conduit is to be continued in use.
- D. Disconnect and remove all accessible piping, conduit, ductwork, materials, fixtures and equipment not required in the new systems. Plug all outlets at the main or riser connection.

- E. Removed materials not desired by the Owner and not to be reset and not specified nor indicated to be reused, become the property of the Plumbing Trade Contractor and must be promptly removed from site.
- F. All demolition work is subject to the direction and approval of the Engineer and must be performed in such manner as not to interfere with the normal operation of the building.
- G. Relocate existing utilities and/or equipment that must remain to maintain operation of building or parts of building outside the work area.

# 3.9 SUBSURFACE CONCEALED UNKNOWN PHYSICAL CONDITIONS

- A. Subsurface, or otherwise concealed physical conditions which (1) do not differ materially from those indicated in the Project Contract Documents; (2) affect plumbing and electrical work; (3) do not differ materially from those ordinarily found to exist, and which are generally recognized as inherent in the mechanical and electrical construction activities of the character provided for in the Project Contract Documents, are to be anticipated by the Plumbing Trade Contractor, and included in the basic plumbing work.
- B. Unknown physical conditions: which are of an unusual nature; which are materially different in subsurface (otherwise concealed) physical conditions; which affect plumbing and/or electrical work; which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character found in the Project Contract Documents, are the basis for, and require notice by, the applicable Trade Contractor, promptly, before such conditions are disturbed. Such conditions may become the basis for a legitimate claim under "Changed Conditions," affecting the cost, and/or schedule of the work. During the work, the Plumbing Trade Contractor shall provide reasonable, incidental on-site review, survey and measurements to assist in quantification of such conditions.

# 3.10 CONCRETE PATCHING (PROCEDURE)

- A. Remove any loose debris, chipped or cracked portions of concrete, and any grease, oil, dirt or other coating materials from the concrete to be patched.
- B. Apply epoxy bonding adhesive to the clean dry surface with a brush or roller to briefly flood the surface allowing good penetration, if completely absorbed, apply additional material. Adhesive Basis of Design: Edison Coatings Inc. Flexi-Bond 540. Comparable product by Sika Corp. or Euclid Chemical Co. may be submitted for review. Refer to Division 03 of these specifications.
- C. Apply new cementitious mortar patch to surface immediately after applying bonding adhesive, bonding agent should be wet while applying concrete patch. Mortar patch equal to Moxie International 2000 Super Patch. Comparable product by Sika Corp. or Euclid Chemical Co. may be submitted for review. Refer to Division 03 of these specifications.
- D. Work patch into any cracks or crevices with a brush, then apply remainder of patch and trowel until level and smooth.

E. Do not apply patch below 45 deg. F.

# 3.11 TEMPORARY PARTITIONS

A. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas. Refer to Division 01 of these specifications.

# 3.12 INITIAL APPLICATION FOR PAYMENT

- A. Provide the following prior to submitting the initial application for payment:
  - 1. Copy of Plumbing Trade Contractor's and Sub-Contractors' licenses for the state in which the work is being performed.
  - 2. Resumes for the designated Project Manager and Project Foreman.
  - 3. List of independent agencies who will be engaged by the Plumbing Trade Contractor to perform tests, provide certifications, conduct inspections, etc. as required by Contract Documents.
- B. The initial application for payment will not be processed until the items above are submitted.
- C. Provide line items for:
  - 1. Coordination Drawings.
  - 2. Plumbing Testing, Adjusting and Balancing Report.

# 3.13 FINAL APPLICATION FOR PAYMENT

- A. Provide the following prior to submitting the final application for payment:
  - 1. Refer to Division 01 of these specifications.
  - 2. Pipe Pressure Test Reports.
  - 3. Equipment Start-Up Reports for each piece of plumbing equipment.
  - 4. Operation and Maintenance Manuals and Data.
  - 5. Testing, Adjusting and Balancing Report for plumbing systems.
  - 6. Plumbing system and equipment warranties.
  - 7. Plumbing Contractor Closeout Checklist indicating dates of submitted requirements.
  - 8. Plumbing Contractor's Punch List of incomplete work items with reason why each work item is not complete and anticipated schedule for completion. Submit at least one week prior to Engineer's final Construction Observation Report site visit.
  - 9. Signed and dated Engineer's final construction observations report.
  - 10. Plumbing Trade Contractor's notarized certification letter.
  - 11. As-built drawings as described in Part 1 of this specification section.
- B. Final payment is contingent upon completion of all items listed above.

### 3.14 INDEMNIFICATION

- A. The drawings and specifications covering the work of Divisions 22 and 26, as applicable, shall not be interpreted by the Plumbing Trade Contractor as quantification, and/or classification of the construction methods, and/or construction means required to carry out the required construction. There is no explicit or implicit representation that any portion of this work can be installed and/or constructed through any particular normal, reasonable, abnormal, or unusual means and methods. By submission of a pricing bid for this work, the Plumbing Trade Contractor shall accept sole and individual responsibility for the determination and execution of the methods and means selected to complete this work.
- B. The Plumbing Trade Contractor, to the fullest extent permitted by law, agrees to indemnify, hold harmless, and defend Gillan & Hartmann, Inc., its consultants, and the employees and agents of any of them from and against any and all claims, suits, demands, liabilities, losses, damages, and costs ("Losses"), including but not limited to costs of reasonable defense, arising in whole or in part out of the negligence of the Plumbing Trade Contractor, its Sub-Contractors, the officers, employees, agents, and Sub-Contractors of any of them, or anyone for whose acts any of them may be liable, regardless of whether or not such Losses are caused in part by a party indemnified hereunder. Specifically excluded from the foregoing are Losses arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs, or specifications, and (2) the giving of or failure to give directions by Gillan & Hartmann, Inc., its consultants, and the agents and employees of any of them, provided such giving or failure to give is the primary cause of Loss.
- C. The Plumbing Trade Contractor shall name Gillan & Hartmann, Inc., its agents and consultants on the Plumbing Trade Contractor's policy or policies of comprehensive or commercial general liability insurance. Such insurance shall include products and completed operations and contractual liability coverages, shall be primary and noncontributing with any insurance maintained by Gillan & Hartmann, Inc. or its agents and consultants, and shall provide that Gillan & Hartmann, Inc. be given thirty days, unqualified written notice prior to any cancellation thereof.

# 3.15 ADDITIONAL PLUMBING TRADE CONTRACTOR PAID FEES AND EXPENSES

- As a material part of Plumbing Trade Contractor's Agreement to complete the work of this Contract, the Plumbing Trade Contractor agrees to reimburse Gillan & Hartmann, Inc. ("Engineer") for the below listed extra engineering work under the following conditions:
  - 1. Engineer's hourly billing rate shall be \$250.00 per hour for all related office hours, travel time and as applicable, on-site time;
  - 2. Contractor's request(s) for substitution;
    - a. When such requests for substitution are not the result of a bonafide delivery problem or design related problem, and;
    - b. When such requests do not address items of equipment for which the specifications list the basis of design with at least one comparable product, and;
    - c. The Plumbing Trade Contractor's request(s) for substitution must be submitted in writing, and;

- d. The Engineer will provide the Plumbing Trade Contractor with a written budget, not to exceed quotation for the Engineer's billing, and;
- e. The Plumbing Trade Contractor shall render written acceptance of the Engineer's extra charges, and;
- f. The Plumbing Trade Contractor shall pay a retainer, in advance, equal to 80% of the established budget for the Engineer's extra work.
- g. The balance of the Engineer's charges beyond the retainage shall be paid upon completion of the Engineers' extra work in reviewing the substitution(s). Final payment is due regardless of the Engineer's decision to accept or reject the Plumbing Trade Contractor's substitution request(s), and;
- h. Late payments shall incur an interest rate of 1½% per month compounded from due date to date of collection, and;
- i. The Plumbing Trade Contractor's balance due for his/her beneficial contracted work, unpaid beyond 60 days of due date, will be deducted from progress payments due the Plumbing Trade Contractor, and will include all additional administrative costs incurred by the Owner, in affecting such deductions.
- 3. Extra Engineering work created by the Plumbing Trade Contractor's failure to resolve the Engineer's Items listed in the Construction Observation Report(s);
  - a. The Engineer's basic services rendered to the Owner include periodic visits to the site and providing written list of items (Construction Observation Report) requiring the Plumbing Trade Contractor's attention, reporting and resolution;
  - b. The Plumbing Trade Contractor shall provide written feedback and prompt resolution of Construction Observation Items including a written schedule for the Plumbing Trade Contractor's completion of these Items followed by a written confirmation of closure;
  - c. Should the Plumbing Trade Contractor fail to perform as described above, and should such failure require, in the opinion of the Owner and the Engineer, that the Engineer must expend extra work in bringing closure and resolving the Plumbing Trade Contractor's open Items, the Plumbing Trade Contractor agrees pay the Engineer for all extra work required. The Engineer will provide a written notice of the not to exceed budget for the Engineer's extra work in advance as a prudent notification that the extra work will be initiated. Subsequent failure of the Plumbing Trade Contractor to resolve these outstanding issues will result in the Engineer's completion of the extra work, and billing the Plumbing Trade Contractor accordingly. The Engineer's payment for this additional work shall be deducted from the Plumbing Trade Contractor's final payment for the work under this Contract. Deductions from the Final Payment will be made to cover all the Owner's additional costs in affecting such deductions.
- 4. The Plumbing Trade Contractor's request for substitution of specified equipment when such specifications list a basis of design and at least one comparable product such requests will be rejected.
- 5. Extra Engineering work created by the Plumbing Trade Contractor's multiple submissions of a single material or piece of equipment;

- a. The Engineer's basic services include two reviews for each piece of equipment or material submittal. The Engineer's first review takes place at the initial Plumbing Trade Contractor's submission of that submittal. The Engineer's second review takes place when the Engineer requires a resubmission of that submittal.
- b. If the Engineer's third review of a particular submittal is required for reasons due to the Plumbing Trade Contractor, the Engineer will provide the Plumbing Trade Contractor with a written budget, not to exceed quotation for the Engineer's extra work in reviewing the submittal.
- c. The Plumbing Trade Contractor shall render written acceptance of the Engineer's extra charges.
- d. The Plumbing Trade Contractor shall pay a retainer, in advance, equal to 80% of the established budget for the Engineer's extra work.
- e. The balance of the Engineer's charges beyond the retainage shall be paid upon completion of the Engineers' extra work in reviewing the submittal.
- f. Late payments shall incur an interest rate of 1½% per month compounded from due date to date of collection.
- g. The Plumbing Trade Contractor's balance, unpaid beyond 60 days of due date, will be deducted from progress payments due the Plumbing Trade Contractor for work under this Contract and will include additional administrative costs incurred by the Owner in affecting all such deductions.

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PLUMBING CONTRACTOR'S TRANSMITTAL COVER									
	SHEET								
TO: GILLAN & HARTMANN, INC. consulting engineers p.o. box 345 valley forge, pennsylvania 19481									
Date of Transmittal:	By Contractor: Contractor's Authorized Staff Signature: Print Name: Project:								
By executing this Transmittal Cov	er, Contractor agrees and accepts that:								
<ul> <li>Shop drawings subm approval stamps are</li> </ul>	itted without the Contractor's signed stamp of approval will not be reviewed. Initialed not acceptable. All resulting resubmittals will be provided at the Contractor's expense;								
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The Contractor other related sh	has completed field layout and planning of proposed equipment and has coordinated all op drawings, related trades involved in Project Construction, and all space requirements;								
The Contractor drawings with a construction or Architect Engin resolution beyo Contractor, and requirements; 4 which are not p	has examined all shop drawings prior to submission. The Contractor forwards all shop 1 signed approved stamp, signifying the following: 1) all field measurements, field iteria, materials, dimensions, catalog numbers and similar data have been varified; 2) the seer have been notified of all site conditions which affect the work, and which require design nd resolution by Trade Contractors' Field Decisions; 3) all items herein are approved by the have been coordinated and checked with other applicable shop drawings, and contract ) submission is clearly marked to indicate which manufacturer's options are provided and rovided with the proposed equipment;								
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All Engineer's	notes regarding this submission must be incorporated into the Project;								
The Engineer' equipment to the sp	s review is limited to comparison of the technical performance of the Contractor's proposed secified technical performance;								
Equipment su	bmittal is either the Basis-of-Design, or a comparable product to the Basis-of-Design;								
A Comparable including, but not l function; design; au Professional's Proj	<ul> <li>Product must meet or exceed all the salient characteristics and standards necessary imited to: material of manufacture; independent testing agency certifications; quality; ad performance required to meet the Owner's needs and meet the objectives of the ect Design;</li> </ul>								
Extension of ( failure to provide a multiple resubmitta Refer to EQUIPME the Specifications.	Contract Time and/or claim for delay are not acceptable as created by the Trade Contractor's ubmittals on a timely basis to permit the processing work of the Professional, including uk, and/or failure to provide submittals that are comparable to the Basis of Design Product. INT VARIATIONS AND SUBSTITUTIONS article in the General Requirements Section of								

G&H Project No: \_\_\_\_\_ G&H Shop Drawing Review No: \_\_\_P-\_\_\_ Contractor's Submittal Description:

, Project

(Fill Iv)

# PLUMBING AND ELECTRICAL TRADES' COORDINATION OF PLUMBING EQUIPMENT ELECTRICAL REQUIREMENTS TRANSMITTAL COVER SHEET TO: GILLAN & HARTMANN, INC.

(Fill Iv)

CONSULTING ENGINEERS P.O. BOX 345 VALLEY FORGE, PENNSYLVANIA 19481

By Plumbing Trade Rep:	By Electrical Trade Rep:
Contractor's Authorized Staff Signature:	Contractor's Authorized Staff Signature:
Print Name:	Print Name:
Date of Transmittal:	Date of Transmittal:

By executing this Transmittal Cover, the Contractor agrees and accepts that:

- Submittals without the Plumbing and Electrical Trades' signed stamp of approval will not be reviewed. Initialed approval stamps are not acceptable. All resulting resubmittals will be provided at the Contractor's expense.
- The Plumbing Trade Representative has submitted the attached Plumbing Equipment Submittal to the Electrical Trade Representative for examination, review, and coordination of the attached Plumbing Equipment Electrical Requirements. The equipment proposed by the Contractor is conditional upon the Contractor fulfilling all obligations of the Contract Documents. By furnishing the proposed equipment, the Contractor acknowledges compliance with all of the following:
  - A. The Contractor has completed field layout and planning of proposed equipment and has coordinated all other related submittals, related Trades involved in Project Construction, and all space requirements.
  - B. The Plumbing and Electrical Trades have examined all submittals prior to submission. The Plumbing and Electrical Trades forwards all submittals with a signed transmittal stamp, signifying the following:
    - All field measurements, field construction criteria, electrical power requirements and similar data have been verified;
    - The Architect/Engineer has been notified of all site conditions which affect the work, and which require design resolution beyond resolution by Trade contractors' Field Decisions;
    - All items herein are approved by the Contractor, and have been coordinated and checked with other applicable submittals, and contract requirements;
    - Submission is clearly marked to indicate which manufacturer's options are provided and which are not provided with the proposed equipment.
  - C. Any and all exceptions requested by the Plumbing and Electrical Trades have been included in written form. All exceptions, deletions, and additions that vary from the Contract Documents have been specifically annotated and initialed. Failing to provide the initialed annotations for all deletions and additions, the Contractor accepts the condition that the Contract Documents will govern, and will be used to resolve disputes.

G&H Project No:

G&H Shop Drawing Review No: \_\_\_\_\_

#### END OF SECTION 220010

#### SECTION 220523 - BALL VALVES

#### 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. Bronze ball valves.

#### 1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. Press-end connection: Valves suitable for connection to a pressure-sealed system.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve.
  - 1. Certification that products comply with NSF 61and NSF 372.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
  - 1. Protect internal parts against rust and corrosion.
  - 2. Protect threads, flange faces, and soldered ends.
  - 3. Set ball valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
  - 1. Maintain valve end protection.
  - 2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

### PART 2 - PRODUCTS

#### 2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
  - 1. ASME B1.20.1 for threads for threaded end valves.
  - 2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
  - 3. ASME B16.18 for solder-joint connections.
  - 4. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 and NSF 372 for valve materials for potable-water service.
- D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.
- E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- F. Valve Sizes: Same as upstream piping unless otherwise indicated.
- G. Valve Actuator Types:
  - 1. Handlever: For quarter-turn valves smaller than NPS 4.
- H. Valves in Insulated Piping:
  - 1. Include 2-inch stem extensions.
  - 2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
  - 3. Memory stops that are fully adjustable after insulation is applied.

#### 2.2 BRONZE BALL VALVES

- A. Bronze Ball Valves, Two-Piece with Full Port, and Bronze or Brass Trim, Threaded or Soldered Ends:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO INC.; or a comparable product by one of the following:
    - a. Apollo Flow Controls; Conbraco Industries, Inc.
    - b. Milwaukee Valve Company.
    - c. WATTS.

- 2. Description:
  - a. Standard: MSS SP-110 or MSS-145.
  - b. CWP Rating: 600 psig.
  - c. Body Design: Two piece.
  - d. Body Material: Bronze.
  - e. Ends: Threaded and soldered.
  - f. Seats: PTFE.
  - g. Stem: Bronze or brass.
  - h. Ball: Chrome-plated brass.
  - i. Port: Full.
- B. Bronze Ball Valves, Two-Piece with Full Port, and Bronze or Brass Trim, Press Ends:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO INC.; or a comparable product by one of the following:
    - a. Apollo Flow Controls; Conbraco Industries, Inc.
    - b. Milwaukee Valve Company.
    - c. WATTS.
  - 2. Description:
    - a. Standard: MSS SP-110 or MSS-145.
    - b. CWP Rating: Minimum 200 psig.
    - c. Body Design: Two piece.
    - d. Body Material: Bronze.
    - e. Ends: Press.
    - f. Press Ends Connections Rating: Minimum 200 psig.
    - g. Seats: PTFE or RTPFE.
    - h. Stem: Bronze or brass.
    - i. Ball: Chrome-plated brass.
    - j. Port: Full.
    - k. O-Ring Seal: EPDM or Buna-N.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. 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.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.

- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

# 3.2 VALVE INSTALLATION

- A. Install valves with unions at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valve tags. Comply with requirements in applicable Division 22 Sections for valve tags and schedules.

# 3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

# 3.4 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 4 and Smaller:
  - 1. Bronze ball valves, two-piece with full port and bronze or brass trim. Provide with threaded, solder, or press connection-joint ends.

### END OF SECTION 220523

### **SECTION 220719 - PLUMBING PIPING INSULATION**

### 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 insulating the following plumbing piping services:
  - 1. Domestic cold water, hot water and hot water recirculation system piping.

### **1.3 ACTION SUBMITTALS**

A. Product Data: For each type of product. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
1. Insulation Installed Indoors: Flame-spread index of 25 or less and smoke-developed index of 50 or less.

# 1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

# 1.7 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in applicable Division 22 Sections.
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

# 1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems. Insulation application may begin on segments that have satisfactory test results.

# PART 2 - PRODUCTS

#### 2.1 INSULATION MATERIALS

- A. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- B. Products that come into contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.
- C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable in accordance with ASTM C795.
- D. Mineral-Fiber, Preformed Pipe: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C547.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Johns Manville; a Berkshire Hathaway company ; Micro-Lok. or a comparable product by one of the following:
    - a. Knauf Insulation.
    - b. Manson Insulation Inc.
    - c. Owens Corning.

- 2. Preformed Pipe Insulation: Type I, Grade A with factory-applied ASJ-SSL.
- 3. 850 deg F.
- 4. Factory fabricate shapes in accordance with ASTM C450 and ASTM C585.
- 5. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

# 2.2 INSULATING CEMENTS

- A. Mineral-Fiber Insulating Cement: Comply with ASTM C195.
- B. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C449.

# 2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- C. PVC Jacket Adhesive: Compatible with PVC fitting cover jacket.

# 2.4 MASTICS AND COATINGS

- A. Materials shall be compatible with insulation materials, jackets, and substrates.
- B. Vapor-Retarder Mastic, Water Based: Suitable for indoor use on below-ambient services.
  - 1. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
  - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
  - 3. Comply with MIL-PRF-19565C, Type II, for permeance requirements.
  - 4. Color: White.
- C. Vapor-Retarder Mastic, Solvent Based, Outdoor Use: Suitable for outdoor use on belowambient services.
  - 1. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
  - 2. Service Temperature Range: Minus 50 to plus 220 deg F.
  - 3. Color: White.
- D. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
  - 1. Water-Vapor Permeance: ASTM E96/E96M, greater than 1.0 perm at manufacturer's recommended dry film thickness.
  - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
  - 3. Color: White.

# 2.5 LAGGING ADHESIVES

- A. Adhesives shall comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.
  - 1. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fireresistant lagging cloths over pipe insulation.
  - 2. Service Temperature Range: 0 to plus 180 deg F.
  - 3. Color: White.

# 2.6 SEALANTS

- A. Materials shall be as recommended by the insulation manufacturer and shall be compatible with insulation materials, jackets, and substrates.
- B. ASJ Flashing Sealants and PVC Jacket Flashing Sealants:
  - 1. Fire- and water-resistant, flexible, elastomeric sealant.
  - 2. Service Temperature Range: Minus 40 to plus 250 deg F.
  - 3. Color: White.

# 2.7 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
  - 1. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.

#### 2.8 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C1136, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
  - 1. Adhesive: As recommended by jacket material manufacturer.
  - 2. Color: White.
  - 3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
    - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

# 2.9 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.
  - 1. Width: 3 inches.
  - 2. Thickness: 11.5 mils.
  - 3. Adhesion: 90 ounces force/inch in width.
  - 4. Elongation: 2 percent.
  - 5. Tensile Strength: 40 lbf/inch in width.
  - 6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
  - 1. Width: 2 inches.
  - 2. Thickness: 6 mils.
  - 3. Adhesion: 64 ounces force/inch in width.
  - 4. Elongation: 500 percent.
  - 5. Tensile Strength: 18 lbf/inch in width.

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
  - 1. Verify that systems to be insulated have been tested and are free of defects.
  - 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 PREPARATION

- A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

# 3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
  - 3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
  - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches o.c.
  - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 4 inches o.c.
    - a. For below-ambient services, apply vapor-barrier mastic over staples.
  - 4. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.

- 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 25 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

# 3.4 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials, except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and Unions:
  - 1. Install insulation over fittings, valves, strainers, flanges, mechanical couplings, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
  - 2. Insulate pipe elbows using preformed fitting insulation made from same material and density as that of adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
  - 3. Insulate tee fittings with preformed fitting insulation of same material and thickness as that used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
  - 4. Insulate valves using preformed fitting insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
  - 5. Insulate strainers using preformed fitting insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers, so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
  - 6. Insulate flanges, mechanical couplings, and unions, using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Stencil or label

the outside insulation jacket of each union with the word "union" matching size and color of pipe labels.

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

# 3.5 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
  - 1. Secure each layer of preformed pipe insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
  - 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
  - 3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
  - 4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Fittings and Elbows:
  - 1. Install preformed sections of same material as that of straight segments of pipe insulation when available.
  - 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
- C. Insulation Installation on Valves and Pipe Specialties:
  - 1. Install preformed sections of same material as that of straight segments of pipe insulation when available.
  - 2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
  - 3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
  - 4. Install insulation to flanges as specified for flange insulation application.

# 3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections with the assistance of a factory-authorized service representative.
- B. Tests and Inspections: Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their

installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

- C. All insulation applications will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

# 3.7 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
  1. Underground piping.

INTERIOR DOMESTIC HOT, HOT RECIRCULATION AND COLD WATER PIPING				
PIPE SIZES <u>(NPS)</u>	MATERIALS	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD APPLIED JACKET
ALL	MINERAL FIBER	1	YES	PVC on fittings

#### END OF SECTION 220719

### SECTION 221116 - DOMESTIC WATER PIPING

# 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. Copper tube and fittings.
  - 2. Piping joining materials.
  - 3. Dielectric fittings.

# **1.3 ACTION SUBMITTALS**

A. Product Data: For transition fittings and dielectric fittings.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. System purging and disinfecting activities report.
- B. Coordination Drawings: Piping layout, drawn to scale, showing all plumbing piping and equipment, and coordinated with other building trades.
- C. Field quality-control reports.

#### 1.5 FIELD CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
  - 1. Notify Architect and Owner no fewer than two days in advance of proposed interruption of water service.
  - 2. Do not interrupt water service without Architect and Owner's written permission.

# PART 2 - PRODUCTS

### 2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14, NSF 61, and NSF 372.

#### 2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
- B. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- C. Copper Unions:
  - 1. MSS SP-123.
  - 2. Cast-copper-alloy, hexagonal-stock body.
  - 3. Ball-and-socket, metal-to-metal seating surfaces.
  - 4. Solder-joint or threaded ends.

#### 2.3 PIPING JOINING MATERIALS

- A. Solder Filler Metals: ASTM B 32, lead-free alloys.
- B. Flux: ASTM B 813, water flushable.

#### 2.4 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Nipples:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Grinnell G-Fire by Johnson Controls Company.
    - b. Precision Plumbing Products.
    - c. Sioux Chief Manufacturing Company, Inc.
  - 2. Standard: IAPMO PS 66.
  - 3. Electroplated steel nipple complying with ASTM F 1545.
  - 4. Pressure Rating and Temperature: 300 psig at 225 deg F.

- 5. End Connections: Male threaded or grooved.
- 6. Lining: Inert and noncorrosive, propylene.

#### **PART 3 - EXECUTION**

#### 3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install shutoff valve immediately upstream of each dielectric fitting.
- D. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- G. Install piping to permit valve servicing.
- H. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in applicable Division 22 Sections.

### 3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

D. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

# 3.3 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 4 and Smaller: Use dielectric nipples.

# 3.4 INSTALLATION OF HANGERS AND SUPPORTS

- A. Comply with requirements for hangers, supports, and anchor devices in applicable Division 22 Sections.
  - 1. Vertical Piping: MSS Type 8 or 42, clamps.
  - 2. Individual, Straight, Horizontal Piping Runs:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
  - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
  - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install hangers for copper tubing and piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- C. Support horizontal piping within 12 inches of each fitting.
- D. Support vertical runs of copper tubing and piping to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

#### 3.5 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

#### 3.6 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in applicable Division 22 Sections.

# 3.7 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Piping Inspections:
    - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
    - b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
      - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
    - c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
    - d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
  - 2. Piping Tests:
    - a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
    - b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
    - c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
    - d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
    - e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
    - f. Prepare reports for tests and for corrective action required.
- B. Domestic water piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

# 3.8 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

- 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
- 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
  - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
  - b. Fill and isolate system according to either of the following:
    - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
    - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
  - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
  - d. Repeat procedures if biological examination shows contamination.
  - e. Submit water samples in sterile bottles to authorities having jurisdiction.
- B. Clean non-potable domestic water piping as follows:
  - 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
  - 2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
    - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    - b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- C. Prepare and submit reports of purging and disinfecting activities. Include copies of watersample approvals from authorities having jurisdiction.
- D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

# 3.9 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Aboveground domestic water piping shall be one of the following:
  - 1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints.

# 3.10 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  - 1. Shutoff Duty: Use ball valves for piping NPS 4 and smaller.

# END OF SECTION 221116

### SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

### 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. Temperature-actuated, water mixing valves.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For domestic water piping specialties.
  - 1. Include diagrams for power, signal, and control wiring.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

#### 1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

#### PART 2 - PRODUCTS

#### 2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Domestic water piping specialties intended to convey or dispense water for human consumption are to comply with the SDWA, requirements of authorities having jurisdiction, and NSF 61 and NSF 372, or to be certified in compliance with NSF 61 and NSF 372 by an American National Standards Institute (ANSI)-accredited third-party certification body that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

# 2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

# 2.3 TEMPERATURE-ACTUATED, WATER MIXING VALVES

- A. Primary, Thermostatic, Water Mixing Valves:
  - 1. Products shall be as manufactured by one of the following:
    - a. Leonard Valve Company.
    - b. POWERS; A WATTS Brand (Basis of Design).
    - c. Lawler manufacturing, Corp.
    - d. Apollo.
  - 2. Standard: ASSE 1017.
  - 3. Pressure Rating: 125 psig minimum unless otherwise indicated.
  - 4. Control: Water temperature +/-2 degrees F in accordance with ASSE 1017 and during periods of low/zero demand.
  - 5. Type: Exposed-mounted, thermostatically controlled, water mixing valve.
  - 6. Material: Bronze body with corrosion-resistant interior components.
  - 7. Connections: Threaded inlets and outlet.
  - 8. Mounting: Mounted on a heavy duty welded strut with corrosion resistance coating.
  - 9. Testing: factory tested as a complete unit.
  - 10. Accessories: Digital temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control. Digital water temperature control and monitoring system shall feature full-color touchscreen interface with is configurable and does not require factory pre-programming, and inlet strainers. System shall include user programmable high temperature alarm. Controller shall be password protected, adjustable outlet temperature range of 80 to 180 degrees F, digitally monitor inlet pressure and temperature, mixed outlet temperature, mixed outlet setpoint, pressure, return water temperature, control external recirculation pump based on return water temperature, integrate with the building management system through Bacnet and Modbus protocols along with local and remote temperature alarms.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION OF PIPING SPECIALTIES

A. Temperature-Actuated, Water Mixing Valves: Install with check stops or shutoff valves on inlets and with shutoff valve on outlet.

# 3.2 PIPING CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

# 3.3 ADJUSTING

A. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

# 3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections.
  - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

# END OF SECTION 221119

# SECTION 221316 - SANITARY WASTE AND VENT PIPING

# 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. Hub-and-spigot, cast-iron soil pipe and fittings.
  - 2. Hubless, cast-iron soil pipe and fittings.
  - 3. Copper tube and fittings.
  - 4. Specialty pipe fittings.
  - 5. Encasement for underground metal piping.

# **1.3 ACTION SUBMITTALS**

A. Product Data: For each type of product.

## 1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

#### 1.5 FIELD CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Owner no fewer than two days in advance of proposed interruption of sanitary waste service.
  - 2. Do not proceed with interruption of sanitary waste service without Owner's written permission.

#### 1.6 WARRANTY

A. Listed manufacturers to provide labeling and warranty of their respective products.

# PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
  - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

# 2.2 PIPING MATERIALS

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

# 2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AB & I Foundry; a part of the McWane family of companies.
  - 2. Charlotte Pipe and Foundry Company.
  - 3. Tyler Pipe; a part of McWane family of companies.
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.
- B. Pipe and Fittings: ASTM A 74, Service class.
- C. Gaskets: ASTM C 564, rubber.
- D. Caulking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

# 2.4 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AB & I Foundry; a part of the McWane family of companies.
  - 2. Charlotte Pipe and Foundry Company.
  - 3. Tyler Pipe; a part of McWane family of companies.
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.
- B. Pipe and Fittings: ASTM A 888 or CISPI 301.
- C. CISPI, Hubless-Piping Couplings:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Charlotte Pipe and Foundry Company; or a comparable product by one of the following:
  - a. MIFAB, Inc.
  - b. Tyler Pipe; a subsidiary of McWane Inc.
  - c. Or approved equal in accordance with the project substitution provisions of the contract.
- 2. Standards: ASTM C 1277 and CISPI 310.
- 3. Description: Heavy duty type. Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

# 2.5 COPPER TUBE AND FITTINGS

- A. Copper Type DWV Tube: ASTM B 306, drainage tube, drawn temper.
- B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solderjoint fittings.
- C. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

# 2.6 SPECIALTY PIPE FITTINGS

- A. Transition Couplings:
  - 1. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
  - 2. Shielded, Nonpressure Transition Couplings:
    - a. Standard: ASTM C 1460.
    - b. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

#### PART 3 - EXECUTION

#### 3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in other Sections.

#### 3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

- 1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
- 2. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.
  - 1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
  - 2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.
    - a. Straight tees, elbows, and crosses may be used on vent lines.
  - 3. Do not change direction of flow more than 90 degrees.
  - 4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.
    - a. Reducing size of waste piping in direction of flow is prohibited.
- J. Lay buried building waste piping beginning at low point of each system.
  - 1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
  - 2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
  - 3. Maintain swab in piping and pull past each joint as completed.
- K. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:

- 1. Building Sanitary Waste: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
- 2. Horizontal Sanitary Waste Piping: 2 percent downward in direction of flow.
- 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- L. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
  - 1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.
- M. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."
- N. Plumbing Specialties:
  - 1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.
    - a. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.
    - b. Comply with requirements for cleanouts specified in applicable Division 22 Sections.
- O. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- P. Install sleeves for piping penetrations of walls, ceilings, and floors.
  - 1. Comply with requirements for sleeves specified in applicable Division 22 Sections.
- Q. Install sleeve seals for piping penetrations of concrete walls and slabs.
  - 1. Comply with requirements for sleeve seals specified in applicable Division 22 Sections.
- R. Install escutcheons for piping penetrations of walls, ceilings, and floors.
  - 1. Comply with requirements for escutcheons specified in applicable Division 22 Sections.

#### **3.3 JOINT CONSTRUCTION**

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- C. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

D. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

# 3.4 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
  - 1. Install transition couplings at joints of piping with small differences in ODs.
  - 2. In Waste Drainage Piping: Shielded, nonpressure transition couplings.

# 3.5 INSTALLATION OF HANGERS AND SUPPORTS

- A. Comply with requirements for pipe hanger and support devices and installation specified in applicable Division 22 Sections.
  - 1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
  - 2. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
  - 3. Vertical Piping: MSS Type 8 or Type 42, clamps.
  - 4. Install individual, straight, horizontal piping runs:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
  - 5. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
  - 6. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install hangers for cast-iron and copper soil piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- C. Support horizontal piping and tubing within 12 inches of each fitting and coupling.
- D. Support vertical runs of cast iron and copper soil piping to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

#### 3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect waste and vent piping to the following:

- 1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
- 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
- 3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.
- 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
- 5. Comply with requirements for cleanouts and drains specified in applicable Division 22 Sections.
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

# 3.7 IDENTIFICATION

- A. Identify exposed sanitary waste and vent piping.
- B. Comply with requirements for identification specified in applicable Division 22 Sections.

# 3.8 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
  - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
  - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary waste and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
  - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.
    - a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
  - 2. Leave uncovered and unconcealed new, altered, extended, or replaced waste and vent piping until it has been tested and approved.
    - a. Expose work that was covered or concealed before it was tested.

- 3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.
  - a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.
  - b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
  - c. Inspect joints for leaks.
- 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight.
  - a. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg.
  - b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.
  - c. Air pressure must remain constant without introducing additional air throughout period of inspection.
  - d. Inspect plumbing fixture connections for gas and water leaks.
- 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
- 6. Prepare reports for tests and required corrective action.

# 3.9 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.
- D. Repair damage to adjacent materials caused by waste and vent piping installation.

#### 3.10 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, soil and waste piping NPS 2 and smaller shall be the following:
  - 1. Copper Type DWV tube, copper drainage fittings, and soldered joints.
- C. Aboveground, soil and waste piping NPS 2-1/2 and larger shall be the following:
  - 1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.

- D. Aboveground, vent piping NPS 2 and smaller shall be the following:
  - 1. Copper Type DWV tube, copper drainage fittings, and soldered joints.
- E. Aboveground, vent piping NPS 2-1/2 and larger shall be any of the following:
  - 1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.

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- F. Underground, soil, waste, and vent piping shall be the following:
  - 1. Service class, cast-iron soil piping; gaskets; and gasketed joints.

# END OF SECTION 221316

### SECTION 224213 - COMMERCIAL WATER CLOSETS

### 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. Water closets.
  - 2. Flushometer valves.
  - 3. Toilet seats.

# 1.3 DEFINITIONS

A. Effective Flush Volume: Average of two reduced flushes and one full flush per fixture.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring.

# 1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves to include in operation and maintenance manuals.

# **1.6 MAINTENANCE MATERIAL SUBMITTALS**

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than one of each type.

# PART 2 - PRODUCTS

### 2.1 FLOOR-MOUNTED, BOTTOM-OUTLET WATER CLOSETS

- A. Water Closets WC-1: Floor mounted, bottom outlet, top spud.
  - 1. Basis-of-Design Product: American Standard, Baby Devoro 2282.001. Subject to compliance with requirements, a comparable product by one of the following may be submitted for review:
    - a. Kohler Co.
    - b. TOTO USA, INC.
  - 2. Bowl:
    - a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
    - b. Material: Vitreous china.
    - c. Type: Siphon jet.
    - d. Style: Flushometer valve.
    - e. Height: 10".
    - f. Water Consumption: 1.28 gal. per flush.
    - g. Spud Size and Location: NPS 1-1/2; top.
    - h. Color: White.
  - 3. Bowl-to-Drain Connecting Fitting: ASME A112.4.3.
  - 4. Flushometer Valve: Refer to the Flushometer Article.
  - 5. Toilet Seat: Refer to the Toilet Seats Article.

### 2.2 FLOOR-MOUNTED, BOTTOM-OUTLET WATER CLOSETS

- A. Water Closets WC-2: Floor mounted, bottom outlet, top spud.
  - 1. Basis-of-Design Product: American Standard, Madera 3461.001. Subject to compliance with requirements, a comparable product by one of the following may be submitted for review:
    - a. Kohler Co.
    - b. TOTO USA, INC.
  - 2. Bowl:
    - a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
    - b. Material: Vitreous china.
    - c. Type: Siphon jet.

- d. Style: Flushometer valve.
- e. Height: 16.5".
- f. Water Consumption: 1.28 gal. per flush.
- g. Spud Size and Location: NPS 1-1/2; top.
- h. Color: White.
- 3. Bowl-to-Drain Connecting Fitting: ASME A112.4.3.
- 4. Flushometer Valve: Refer to the Flushometer Article.
- 5. Toilet Seat: Refer to the Toilet Seats Article.

# 2.3 FLUSHOMETER VALVES

A. Manual Operated Diaphragm Flushometer Valves:

Standard of Design: Sloan 111-1.28. Subject to compliance with requirements, a comparable product by one of the following may be submitted for review:

- a. Gerber Plumbing Fixtures LLC.
- b. Zurn Industries, LLC.
- 2. Standard: ASSE 1037.
- 3. Minimum Pressure Rating: 100 psig.
- 4. Features: Include integral check stop and backflow-prevention device (vacuum breaker).
- 5. Material: Brass body with corrosion-resistant components.
- 6. Exposed Flushometer-Valve Finish: Chrome plated.
- 7. Style: Exposed.
- 8. Manual operated diaphragm type flushometer.
- 9. Consumption: 1.28 gal. per flush.
- 10. Minimum Inlet: NPS 1.
- 11. Minimum Outlet: NPS 1-1/4.

#### 2.4 TOILET SEATS

- A. Toilet Seats:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. American Standard America.
    - b. Bemis Manufacturing Company.
    - c. Kohler Co.
    - d. TOTO USA, INC.
  - 2. Standard: IAPMO/ANSI Z124.5.
  - 3. Material: Plastic.
  - 4. Integral Anti-Microbial Coating: Required
  - 5. Type: Commercial (Heavy duty).

- 6. Standard: Elongated rim, open front.
- 7. Hinge: Non-Self-sustaining.
- 8. Hinge Material: Noncorroding metal.
- 9. Color: White.
- 10. Standard of Design WC-1: Bemis Model BB955C.
- 11. Standard of Design WC-2: Bemis Model 2155CT.

#### PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.
- B. Examine walls and floors for suitable conditions where water closets will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Water-Closet Installation:
  - 1. Install level and plumb according to roughing-in drawings.
  - 2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
- B. Support Installation:
  - 1. Install water closet flange for floor mounted, bottom discharge water closets.
- C. Flushometer-Valve Installation:
  - 1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
  - 2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
  - 3. Install actuators in locations that are easy for people with disabilities to reach.
- D. Install toilet seats on water closets.
- E. Joint Sealing:
  - 1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
  - 2. Match sealant color to water-closet color.
  - 3. Comply with sealant requirements specified in applicable Division 07 Sections.

# 3.3 CONNECTIONS

- A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.
- B. Comply with water piping requirements specified in applicable Division 22 Sections.
- C. Comply with soil and waste piping requirements specified in applicable Division 22 Sections.
- D. Where installing piping adjacent to water closets, allow space for service and maintenance.

# 3.4 ADJUSTING

- A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.
- B. Adjust water pressure at flushometer valves to produce proper flow.

#### 3.5 CLEANING AND PROTECTION

- A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed water closets and fittings.
- C. Do not allow use of water closets for temporary facilities.

## END OF SECTION 224213

### **SECTION 224216 - COMMERCIAL LAVATORIES**

# 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. Vitreous-china, wall-mounted lavatories.
  - 2. Automatically operated lavatory faucets.
  - 3. Supply fittings.
  - 4. Waste fittings.
  - 5. Lavatory supports.

# **1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring of automatic faucets.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.
  - 1. In addition to items specified in other Sections, include the following:
    - a. Servicing and adjustments of automatic faucets.

# **1.6 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
  - 2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

# PART 2 - PRODUCTS

# 2.1 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

- A. Lavatory Solid Surface, Wall Mounted, with Back:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. Bradley Corp.
    - b. American Standard.
    - c. Kohler Co.
    - d. Zurn Industries, LLC.
    - e. Or approved equal in accordance with the project substitution provisions of the contract.
  - 2. Fixture:
    - a. Standard: ASME A112.19.2/CSA B45.1.
    - b. Type: For wall hanging.
    - c. Mounting Material: Manufacturers carrier.
  - 3. Lavatory Mounting Height: Handicapped/elderly in accordance with ICC A117.1.

### 2.2 AUTOMATICALLY OPERATED LAVATORY FAUCETS

- A. NSF Standard: Comply with NSF 61 and NSF 372 for faucet materials that will be in contact with potable water.
- B. Lavatory Faucets Infrared Type, Hard Wired:
  - 1. Basis-of-Design Product: Sloan model ETF-610. Subject to compliance with requirements, a comparable product by one of the following may be submitted for review:
    - a. Bradley Corporation.

- b. Moen Incorporated.
- c. TOTO USA, INC.
- d. Or approved equal in accordance with the project substitution provisions of the contract.
- 2. Standards: ASME A112.18.1/CSA B125.1.
- 3. General: coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
- 4. Body Material: Commercial, solid-brass, or die-cast housing with brazed copper and brass waterway.
- 5. Finish: Polished chrome plate.
- 6. Maximum Flow Rate: 0.5 gpm.
- 7. Mounting Type: Deck.
- 8. Spout: Rigid type.
- 9. Spout Outlet: Laminar flow.

# 2.3 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF 61 and NSF 372 for supply-fitting materials that will be in contact with potable water.
- B. Standard: ASME A112.18.1/CSA B125.1.
- C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless steel wall flange.
- D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.
- E. Risers:
  - 1. NPS 1/2.
  - 2. ASME A112.18.6/CSA B125.6, braided- or corrugated-stainless steel, flexible hose riser.

# 2.4 WASTE FITTINGS

- A. Standard: ASME A112.18.2/CSA B125.2.
- B. Drain: Grid type with NPS 1-1/4 offset and straight tailpiece.
- C. Trap:
  - 1. Size: NPS 1-1/4.
  - 2. Material:
    - a. Chrome-plated, one-piece, cast-brass trap with swivel 0.029-inch-thick tubular brass wall bend; and chrome-plated, brass or steel wall flange.

b. Stainless steel, two-piece trap and swivel elbow with 0.012-inch thick stainless steel tube to wall, and stainless steel wall flange.

### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.
- B. Examine counters and walls for suitable conditions where lavatories will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 INSTALLATION

- A. Install lavatories level and plumb in accordance with roughing-in drawings.
- B. Install supports, affixed to building substrate, for wall-mounted lavatories.
- C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, in accordance with ICC A117.1.
- D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in applicable Division 22 Sections.
- E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildewresistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in applicable Division 07 Sections.
- F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in applicable Division 22 Sections.

#### 3.3 PIPING CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in applicable Division 22 Sections.
- C. Comply with soil and waste piping requirements specified in applicable Division 22 Sections.
### 3.4 ADJUSTING

A. Operate and adjust lavatories and controls and thermostatic mixing valve. Replace damaged and malfunctioning lavatories, fittings, and controls.

## 3.5 CLEANING AND PROTECTION

- A. After completing installation of lavatories, inspect and repair damaged finishes.
- B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed lavatories and fittings.
- D. Do not allow use of lavatories for temporary facilities.

### END OF SECTION 224216

### SECTION 224716 – BOTTLE FILLING STATION & SINGLE ADA COOLER

### 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 ACTION SUBMITTALS

- A. Product Data:
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring.

#### 1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: To include in maintenance manuals.

#### 1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Filter Cartridges: Furnish two to District.

### PART 2 - PRODUCTS

#### 2.1 BOTTLE FILLING STATION & SINGLE ADA COOLER (BF-1)

- A. Basis of Design is Elkay ezH2O Model LZS8WSP complete with bottle filler, water cooler, filter, electronic bottle filler sensor, compressor, wall carrier and visual filter monitor or approved equal in accordance with the project substitution provisions of the contract.
- B. Provide filter on water supply.
- C. Chilling capacity: 8.0 GPH (80F to 50F @ 90F ambient).

- D. UL 399 certified.
- E. Lead-free design.

## 2.2 SUPPORTS

A. Per manufacturer's recommendations.

## PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.
- B. Examine walls and floors for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.
- B. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.
- C. Install mounting frames, affixed to building construction, and attach recessed, pressure water coolers, and in-wall bottle filling stations to mounting frames.
- D. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball valve. Install valves in locations where they can be easily reached for operation. Valves are specified in applicable Division 22 Sections.
- E. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.
- F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in applicable Division 22 Sections.
- G. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in applicable Division 07 Sections.

## 3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in applicable Division 22 Sections.
- C. Install ball shutoff valve on water supply to each fixture. Install valve upstream from filter for water cooler. Comply with valve requirements specified in applicable Division 22 Sections.
- D. Comply with soil and waste piping requirements specified in applicable Division 22 Sections.

### 3.4 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

### 3.5 CLEANING

- A. After installing fixture, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.
- C. Provide protective covering for installed fixtures.
- D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

## END OF SECTION 224716

PART 5 - HEATING, VENTILATING & AIR CONDITIONING WORK

### SECTION 230010 - GENERAL REQUIREMENTS HVAC

### 1.1 GENERAL

- A. One Building Trade, the Heating, Ventilating and Air Conditioning (HVAC) Building Trade, will be covered by these General Requirements HVAC.
- B. For simplicity, this Building Trade will be referred to further herein as the HVAC Trade Contractor. The HVAC Specifications and all HVAC Drawings, together with all addenda makeup the HVAC Contract Documents, and are a part of the "Project Contract Documents", as described throughout these specifications.
- C. The term "Electrical Trade" as used in the Contract Documents, means the Electrical Building Trade.
- D. The term "indicated" means all information included, detailed, shown and/or implied on the Contract Documents.
- E. The term "existing" is used generally in reference to renovation projects. On new construction projects, the term "existing" is intended to mean work already in place.

### 1.2 SCOPE AND OBJECTIVES OF THE HVAC WORK

- A. The Scope and Objectives of the HVAC Work of this Project include, but are not limited to:
  - 1. Selected removals on HVAC equipment, ductwork, piping, insulation, valves and accessories;
  - 2. New HVAC Equipment including unit ventilators, packaged rooftop equipment, roof curbs, adapter curbs and accessories;
  - 3. Ductwork;
  - 4. Piping;
  - 5. Ductwork and piping insulation;
  - 6. Testing, adjusting and balancing;
  - 7. Automatic temperature controls;
  - 8. Owner training;
  - 9. Preparation of coordination drawings;
  - 10. Preparation of as-built drawings in AutoCad format;
  - 11. Periodic inspection of completed work to confirm compliance with Contract Documents;
  - 12. Refer to Division 01 Section "Summary" for additional information.

### **1.3** INTENT OF THE HVAC CONTRACT DOCUMENTS

A. The intent of the HVAC Contract Documents is to include all items and labor necessary for the proper execution and completion of the Work of the HVAC Trade Contractor. The Contract

Documents of all Trades are complimentary to each other; what is required by one shall be as binding as if required by all. Performance of the HVAC Trade Contractor is required only to the extent consistent with the Project Contract Documents and reasonably inferable from them as being necessary to produce the desired results.

B. It is expressly stipulated that neither the Drawings nor the Specifications shall take precedence over the other, and it is further stipulated that the Design Professional may interpret or construe the Drawings and Specifications so as to secure in all cases the result most consistent with the needs and requirements of the work. In the event of such ambiguity or discrepancy, the Contractor shall comply with the higher cost product (material plus labor), the more stringent requirement, and supply the better quality or greater quantity of work.

# 1.4 PROPOSAL PREPARATION

- A. Prior to submitting a pricing quotation/proposal, proceed as follows, and include the following:
  - 1. Visit the site, survey, record, confirm and include in the scope of work, all material and labor necessary to install the equipment and systems specified. Use the Contract Documents as diagrammatic in nature, since they are not intended to show all details which may affect the HVAC bid proposal.
  - 2. Include the work, as applicable, to remove and dispose of conduit, piping, insulation, ductwork, equipment and appurtenances not required for new work, unless otherwise indicated to be abandoned in place.
  - 3. Include all disconnections, removals and temporary provisions required to permit rigging, installation, connection, testing and operation of the new equipment. Include all such provisions whether or not shown, detailed or specified within technical sections of the Contract Documents.
  - 4. Include in the work, the following:
    - a. One Project Manager;
    - b. One Project Foreman;
    - c. Sheet Metal Sketcher.
      - 1) It is recommended that the Sheet Metal Sketcher have a minimum of 10 years of applicable experience. Sheet Metal Sketcher shall prepare all equipment arrangements and layout drawings, and initiate coordination drawings.
  - 5. Detail, layout, coordination and fit of all of HVAC equipment. Plan all disconnections, removals, offsets, temporary provisions, as required, to fit the new equipment into the space, and as required to accommodate maintenance accessibility and service access.
  - 6. Maintain and submit for approval, a written project schedule, on a weekly basis.
  - 7. Organize, administrate, control and log the RFI process for his trade. Where applicable, submit all RFI(s) for master RFI log maintained by Lead/Prime Contractor.

- B. In preparing a Bid Price:
  - 1. Thoroughly review and confirm all existing conditions and Contract Document information. Make note in writing of any exceptions, misunderstandings, unclear areas, unclear directions, and any aspects which will prohibit completion of the work, in total. Failing to supply such notice, all bidders will be accountable for having accepted all conditions at the site which affect their work and their costs. By submitting a bid price, the HVAC Trade Contractor certifies that the Contract Documents have been thoroughly reviewed and are sufficient for construction, and that the bidding HVAC Trade Contractor has adequate information to establish and determine his responsibility for materials, methods, costs, and schedule.
  - 2. Incorporate all requirements of all sections of the Contract Documents.
  - 3. Include the following with the Manufacturer's and Sub-Contractor's Lists:
    - a. The name and telephone number of all Sub-Contractors.

## 1.5 HAZARDOUS MATERIALS

A. The use of asbestos, PCB's or any material or product containing hazardous materials in the performance of this contract is not permitted. Certify, in writing, that no hazardous material or product containing a hazardous material, has been furnished or installed.

### 1.6 DRAWINGS AND SPECIFICATIONS

- A. It is the intent of the specifications and drawings to include under each item all materials, apparatus and labor necessary to properly install, equip, adjust and put into perfect operation the respective portions of the installations specified and to so interconnect the various items or sections of the work as to form a complete and properly operating whole.
- B. Any apparatus, machinery, small items not mentioned in detail which are necessary to complete or perfect any portion of the installation in a substantial manner and in compliance with the requirements stated, implied or intended must be furnished and/or installed without extra cost to the Project. This includes all materials, devices or methods peculiar to the machinery, apparatus or systems furnished and/or installed by the HVAC Trade Contractor.
- C. In referring to drawings, figured dimensions take precedence over scale measurements. Verify all wall locations, ceiling heights, elevations, dimensions, etc. on the architectural drawings, where applicable. Discrepancies must be referred to the Design Professional for decision. Certify and verify all dimensions, routings and layouts in the field and on the coordination drawings before ordering material or commencing work.
- D. Any work called for in the specifications, but not mentioned or shown on the drawings, or called for on the drawings, but not mentioned in the specifications, must be furnished and/or installed as though called for in both.

- E. When any device or part of equipment is herein referred to in the singular number, such as "the pump" such reference is deemed to apply to as many such devices as required to complete the installation.
- F. The term "Provide" means "Furnish and Install". Neither term will be used generally in these specifications, but will be assumed. The term "Furnish" means to obtain and deliver to the job site for installation by other trades.

# 1.7 LAWS, ORDINANCES, REGULATIONS AND PERMITS

- A. The entire HVAC system in all and/or in part must conform to all pertinent laws, ordinances and regulations of all bodies having jurisdiction, notwithstanding anything in these drawings or specifications to the contrary.
- B. Pay all fees and obtain and pay for all permits and inspections required by any authority having jurisdiction in connection with the work under this contract.
- C. Electrical work performed by the HVAC Trade Contractor must comply with the requirements of the National Electrical Code, NFPA and other boards and departments having local jurisdiction. Obtain and pay for an Independent Inspection by an authorized Electrical Inspection Agency (EIA) and by local, municipal and state approving agencies. Inspections performed by the local inspector do not substitute for obtaining Independent Inspection by an authorized Inspection by an authorized Inspection by the local inspector do not substitute for obtaining Independent Inspection by an authorized independent Electrical Inspection Agency.
  - 1. Qualifications: The EIA is to be an independent company from the HVAC Trade Contractor, registered with the State and a Master certified member of the International Association of Electrical Inspectors.
  - 2. Prepare and submit for review and comment to the Engineer a schedule of inspections to be performed in coordination with the construction schedule.
  - 3. At a minimum, inspections shall be performed at the Rough-in, Progress and Final levels.
  - 4. The EIA shall submit written report for each level of inspection to the Engineer to document compliance with current code requirements, including deficiencies and associated required remedial action.

## 1.8 TESTS

- A. The following requirements are supplementary to tests specified for individual equipment or systems in other specification sections. Give written notice of date of test in ample time to all concerned.
- B. Concealed or insulated work must remain uncovered until all required tests have been completed; but if construction schedule requires, arrange for partial tests on portions of systems as approved. If a Prime Contractor covers or directs a Sub-Contractor to cover HVAC work prior to completing the required tests, the Prime Contractor is responsible for any additional costs related to completing the required tests.

- C. As soon as conditions permit, conduct preliminary tests of equipment to ascertain compliance with specified requirements. Make needed changes, adjustments and/or replacements as preliminary tests may indicate, prior to acceptance tests.
- D. Conduct pressure, performance and operating tests as specified or required for each system or piece of equipment installed, modified or affected under this contract in presence of the Engineer or Owner as well as a representative of agencies having jurisdiction.
- E. Obtain Certificates of Approval and/or Acceptance as specified or required in compliance with regulations of agencies having jurisdiction. Work will not be deemed complete until such Certificates have been delivered to the Design Professional.
- F. Prove conclusively, by testing, that HVAC systems operate properly, efficiently and quietly in accordance with intent of drawings, specifications and most widely used construction practices.

## 1.9 CLEANING

- A. Be responsible for the following:
  - 1. Removal of all lumber, refuse, metal, piping and debris from site resulting from HVAC work.
  - 2. Cleaning drippings created by the HVAC work, from finished work of other Trades.
  - 3. Cleaning, polishing, waxing of HVAC work as required.
- B. After testing, and acceptance of all work by the Design Professional and the Owner, thoroughly clean all HVAC equipment and material to the satisfaction of the Design Professional.

## 1.10 INSTRUCTING OWNER'S PERSONNEL

- A. After all tests and adjustments have been made, fully instruct the representatives of the Owner in all details of operation of the equipment installed under the HVAC Contract Documents.
- B. Operate HVAC equipment for sufficient length of time to satisfy Design Professional that requirements of Contract Documents have been fulfilled.
- C. Prepare digital recording of each Owner training session on compact disc.

# 1.11 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Provide in accordance with the general construction contract documents.
- B. Submit digital format PDF of Operating and Maintenance Instructions to the Design Professional for review and processing prior to submission of the hardcopy submission to the Architect.

- C. Upon completion of the Design Professional's review and processing of digital format PDF of the Operating and Maintenance Instructions, submit the final version of the form of three (3) copies of printed instructions to the Owner. Bind instructions in separate, hardback, 3-ring loose leaf binders.
- D. Prepare instruction books by sections and include detailed Operating and Maintenance Instructions for all components of all systems, including wiring, and piping diagrams necessary for clarity. Identify the covers with the name of the project and the words "Operating and Maintenance Instructions - HVAC".
- E. Each section must have labeled tabs and be clearly marked with equipment or system name and contain detailed parts list data, ordering information therefore and the name, address and telephone number of the closest supply source.
- F. All instructional data must be neatly and completely prepared to the satisfaction of the Engineer.
- G. Provide complete copy of all warranties in separate tab with the binder.
- H. Provide copies of the as-built drawings in the manuals.
- I. Provide copy of each submittal for each piece of equipment on the project, complete with all tag numbers, Contractor's Transmittal Cover Sheet and Design Professionals final Submittal Review Sheet.
- J. Provide compact disc of Owner training sessions with the manuals.
- K. Provide complete copy of the final HVAC Testing, Adjusting and Balancing Report.
- L. Provide complete copy of the HVAC System Commissioning Report, if applicable.
- M. Provide complete copy of the final Automatic Temperature Control (ATC) System Commissioning Report, if applicable.
- N. Provide complete copy of all mechanical equipment/system start-up reports.

## 1.12 GUARANTEE

- A. All material, equipment and workmanship must be in first class operating condition in every respect at time of acceptance by Owner. Acceptance by the Owner will be by letter written to the HVAC Trade Contractor.
- B. Unconditionally guarantee in writing all materials, equipment and workmanship for a period of one (1) year from date of acceptance by Owner. During the guarantee period, repair or replace, at the HVAC Trade Contractor's expense, any materials, equipment or workmanship in which defects may develop and provide free service for all equipment and systems involved in the contract during this guarantee period. Beneficial use of any system by any of the Trade

Contractors during construction does not constitute acceptance by the Owner. Time period of this beneficial use cannot be included in the guarantee period.

- C. Guarantee must also include restoration to its original condition of all adjacent work that is disturbed in fulfilling this guarantee.
- D. All such repairs and/or replacements must be made without delay and at the convenience of the Owner.
- E. Guarantees furnished by Trade Contractors and/or equipment manufacturers must be counter-signed by the related Trade Contractor for joint and/or individual responsibility for subject item.
- F. Manufacturers' equipment guarantees or warranties extending beyond the guarantee period described in item B above must be transferred to the Owner along with the Trade Contractor's guarantees.

### 1.13 ENTRANCE OF EQUIPMENT

- A. Determine the method of equipment entrance during initial site visit prior to bidding. Do not scale building opening, door widths and equipment or component sizes off the drawings. Determine sizes from site measurements and equipment manufacturer. Include cost of equipment manufacturer's knockdown, use of field assembled equipment, field assembly, all work required for access, removals, replacements, general construction, and the like, as required. During preparation of submittals, verify whether knocked-down or predisassembled equipment have been proposed all to the extent required to permit entry of equipment to final location. Verify that the use of field assembled (not pre-assembled) equipment complies with manufacturer's warranty, guarantee, listings and requirements.
- B. Perform all necessary rigging required for completion of HVAC work.
- C. Deliver products to the site properly identified with names, model numbers, types, grades, compliance labels and other information needed for identification. Deliver products and equipment to the site properly weatherproofed.
- D. The Trade Contractor who furnishes or purchases the product or equipment is responsible to provide and maintain protection from the weather, dust, dirt, construction debris, etc. until the project is complete.
- E. For all products and equipment which, when installed, have an opening into the building must be provided with a plywood cover, or similar protection, to prevent debris, rain, etc. from entering the building. The Trade Contractor who installs the product or equipment is responsible for such protection beginning at the time of installation.

## 1.14 VISITS TO SITE

- A. Due to the nature of the work involved under these Contract Documents, all bidders are recommended to thoroughly examine the site. Coordinate and schedule all site visits with the Owner.
- B. Thoroughly review Contract Documents prior to visiting the site, take Contract Documents to site and thoroughly explore to any extent necessary, the existing conditions as relating to fulfilling the requirements of these Contract Documents.
- C. If discrepancies are noted between requirements of Contract Documents and existing conditions, Trade Contractors must so indicate to Design Professional during bidding period and receive clarification before bidding. Failure to comply with this requirement will result in Design Professional's interpretation during the construction period such that the Design Professional's decision will be final and binding as the sole interpreter of the contract requirements.
- D. Extras will not be considered for any work relating to connections with existing systems or adaptability of new systems to existing structures.

## 1.15 REQUESTS FOR INFORMATION, RFI(s)

- A. Manage RFI(s) in a formal manner. Preparation and submission must comply with the process specified herein to be of maximum benefit to the project. RFI(s) which do not comply with this process will be returned without comment.
- B. All RFI(s):
  - 1. Must be submitted in written form to the party designated at the construction phase kick-off meeting;
  - 2. Must be consecutively numbered, dated, and logged as directed, during the kick-off meeting;
  - 3. Those which are follow-up RFI(s), must use the same RFI number, with a sequential submission number;
  - 4. Must list the RFI number of any reference RFI(s) used in the narrative;
  - 5. Must present: background; related drawings; specification articles; room, space locations (as designated on Contract Documents including wing, column line designation, floor designation, and/or north, south, and the like), and must be presented as complete, clearly written thoughts, in legibly printed or typed form;
  - 6. Must be completed by the HVAC Trade Contractor's Designated Project Foreman, under the control and overview of the HVAC Trade Contractor's Project Manager;
  - 7. Must include HVAC Trade Contractor's Project Foreman's suggested resolution to RFI;
  - 8. Must evidence a high level of fluency with the Contract Documents, all job progress correspondence, all Addenda, all Construction Bulletins, and specifically the Mechanical/Electrical Specifications including: all specifications.
- C. The HVAC Trade Contractor's designated Project Manager must demonstrate familiarity with and responsibility for all RFI(s) prepared by the Project Foreman and must periodically submit

an initialed log of RFI(s) signifying control of RFI(s) relating to specification and job scope issues.

- D. Issues relating to job scope, work included, methods and means which are either clearly discernable from the Contract Documents and/or clearly the responsibility of the HVAC Trade Contractor must be answered by the HVAC Trade Contractor's Project Manager and resolved between the Foreman and Project Manager prior to resorting to written RFI(s). The work of the Project Manager must evidence: fluency with the methods and means anticipated by the HVAC Trade Contract Documents, and all administrative issues related thereto.
- E. Items or issues which relate to non-compliance to associated codes or regulations must reference code interpretations or the published adopted code or regulation. The reference must be either an excerpt of the code or regulation, published addenda to the code or regulation, a formal interpretation written by a representative of the associated agency, or letter of non-compliance from the Authority Having Jurisdiction. All cited code requirements must include the applicable code title, code version or date, and code section number designation. If the RFI does not contain the required information, the RFI will be returned without comment.

## 1.16 AS-BUILT DRAWINGS

- A. Prepare reproducible (paper) and electronic (flash drive) record documents in AUTOCAD .dwg format (Version 2000 or later) in accordance with the requirements in Division 01. Use commercial CAD drafting service if HVAC Trade Contractor does not have CAD capabilities inhouse. As an option, if requested by the HVAC Trade Contractor, an electronic copy (AutoCad .dwg format) of any of the Division 23 Contract Drawings may be provided by the Design Professional at a cost of \$250.00, paid in advance, by the requesting Contractor. In addition to the requirements specified in Division 01, indicate the following installed conditions:
  - 1. Ductwork mains and branches, size and location; locations of dampers and other control devices; filters, boxes and terminal units requiring periodic maintenance or repair.
  - 2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, and the like). Valve location diagrams, complete with valve tag chart.
  - 3. Equipment locations (exposed and concealed), dimensioned from prominent building lines and annotated with permanent equipment number approved by Owner. Include code and equipment service clearances.
  - 4. Approved substitutions, Addenda and Bulletin Contract Modifications, and actual equipment and materials installed.

#### 1.17 SERVICING OF EQUIPMENT AND SYSTEMS

A. After work has been completed in accordance with the Contract Documents, and prior to final acceptance tests, each Trade Contractor must have manufacturers or their authorized agents of the equipment installed, completely check their equipment and put equipment into proper

operation. In each case, the respective Trade Contractor must have the manufacturers thoroughly check the complete installation of the equipment, furnished by the manufacturer, for proper and correct operation under the service intended.

- B. Six months after final acceptance of the work under the Contract Documents, each of the Trade Contractors must have the manufacturers again check their equipment for proper operation and lubrication. Coincidentally, these Trade Contractors must assure that the Owner is properly instructed in the servicing of the equipment.
- C. Prior to expiration of the guarantee period, each Trade Contractor must check all equipment, materials and systems for which he is responsible, make necessary adjustments and/or replacements, and leave systems in first class operating condition.

### 1.18 CONTINUITY OF SERVICES

- A. Generally, no actions can be taken by the HVAC Trade Contractor that will interrupt any of the existing building services for these buildings or any other building until previously arranged and scheduled with the Design Professional and Owner.
- B. Should any service be interrupted by the HVAC Trade Contractor, immediately provide all labor, including overtime if necessary, and all material and equipment necessary for restoration of such service, at no additional cost to the Project.

#### 1.19 TEMPORARY FACILITIES, UTILITIES AND HEATING

A. Refer to the general construction contract documents of these specifications.

#### **1.20 SMOKE AND FIRESTOPPING (GENERAL)**

- A. Furnish and install a material or a combination of materials to form an effective barrier against the spread of flame, smoke and gases, and to maintain the integrity of the "fire and/or smoke" rated construction. Refer to the general construction contract documents of these specifications. Fire and smoke rated construction is identified on the general construction contract documents. Provide firestopping in the following locations:
  - 1. Pipe, ductwork and conduit penetrations through above grade floor slabs and through "fire and/or smoke"-rated partitions and fire walls.
  - 2. Penetrations of vertical shafts including, but not limited to pipe chases, duct chases, elevator shafts, and utility chutes.
  - 3. Other locations where indicated or required.
- B. Prepare submittals and submit for approval. Include manufacturer's descriptive data, typical details, installation instructions and the fire/smoke test data and/or report as appropriate for the time rated construction and location. The fire/smoke test data must include a certification by a nationally recognized testing authority that the material has been tested in accordance with ASTM E 814, or UL 1479 fire tests.

C. Deliver materials in the original unopened packages or containers showing name of the manufacturer and the brand name. Store materials off the ground, and protect from damage and exposure to elements. Damaged, deteriorated or outdated shelf life materials shall not be used and must be removed from the site.

## 1.21 COORDINATION DRAWINGS

- Α. The HVAC Trade Contractor must initiate preparation of coordination drawings, control original reproducibles, collect, organize and facilitate the work/input of General Construction Trade Contractor and all other building trades, as applicable, relative to the 100% final submission of the coordination drawings. Prepare coordination drawings in accordance with Division 01, to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of equipment and materials in relationship with other systems, installations, and building components. Use proposed equipment submittals, which include certified dimensions, service clearances, etc., to prepare the coordination drawings. If equipment is submitted for review after completion of the coordination drawings and rejected during the submittal review process, because the equipment fails to meet the project specifications, the HVAC Trade Contractor is responsible to revise the coordination drawings and layout the work using equipment which meets the project specifications. Designate all specified return air plenums, locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
  - 1. Indicate the proposed locations of piping, ductwork, equipment, and materials. Include the following:
    - a. Clearances for installing and maintaining insulation.
    - b. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
    - c. Equipment connections and support details.
    - d. Exterior wall and foundation penetrations.
    - e. Fire-rated wall and floor penetrations.
    - f. Sizes and location of required concrete pads and bases.
    - g. Valve stem movement.
    - h. Service clearance for equipment behind access doors.
    - i. Location of structural columns, beams and supports.
  - 2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
  - 3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls and ceilings and their relationship to other penetrations and installations.
  - 4. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling mounted items.

- 5. The foregoing information and coordination work must be provided by the applicable Trade Contractor using the coordination drawings as initiated by the HVAC Trade Contractor.
- 6. The HVAC Trade Contractor must submit completed coordination drawings for record purposes, not for technical review and approval, but as proof that the coordination drawings have been completed. The coordination drawings must be completed and submitted for record in advance of submission of sheet metal shop drawings.

### 1.22 NATURAL GAS PIPING SUBMITTALS

- A. Sizes specified for materials such as gas vents and natural gas piping, are included in the Contract Documents and intended for bidding purposes as applicable to each Trade Contractor. Actual sizes required for approved system performance depend on the actual length of runs, routing, bends, offsets, fittings and elbows, planned by the HVAC Trade Contractor during his layout of his work and must account for existing/new field conditions.
- B. Submit product data and shop drawings, as applicable to each Trade Contractor, for the gas piping. Submittals shall indicate all aspects of the work layout including: materials; length; routing; bends; offsets; fittings; elbows; and compliance with equipment manufacturer's directions (specifications, limitations, sizing tables, etc. required to meet such specifications). Attach copies of manufacturer's specifications and performance tables to required equipment submittals.
- C. Processing of gas piping submittals and piping layout shop drawings will be handled in a manner identical to sheet metal shop drawings (conformance to SMACNA recommendations for example) which requires the HVAC Trade Contractor to conform to accepted standards relative to sizing, pressure drop limits, manufacturer's recommendations, NFPA, and Fuel Gas Code.
- D. Submit Manufacturer's or Trade Contractor's confirming calculations of pressure drops, and/or sizing resulting from all of the variables controlled by the HVAC Trade Contractor during his layout of the work for review by the Engineer as part of the submittal review process.

## **1.23 TRADE CONTRACTOR'S CERTIFICATION**

A. Upon final completion of all work, each Trade Contractor must provide a notarized letter on Corporate letterhead, executed by a Corporate Officer, or Company Partner, stating that the work has been completed in accordance with the Contract Documents, Addenda, Bulletins, Trade Contractor's Punch List items and Design Professional's Construction Observation Report(s). Final Payment will not be approved until the notarized letter has been provided. Refer to the following sample letter.

#### SAMPLE LETTER

ENGINEER/ARCHITECT	
TRADE CONTRACTOR	
PROJECT	NO
I hereby certify that all work under Contract Documents, as applicable Construction Observation Reports of the work has been performed in	r the HVAC, Plumbing, Fire Protection and Electrical e, including all addenda, bulletins, Punch List items and a, has been completed and the quality and workmanship n accordance with Contract Documents.
	State of:
	County of:
Trade Contractor:	Subscribed and Sworn to before me this day of 20
	Notary Public:
By: Date:	My Commission Expires:
	🔁 (Ctrl) 🗸

#### 1.24 CONNECTIONS TO EXISTING SYSTEMS

- A. Work under this contract may require connections to existing hydronic systems. Include in the bid, all material and labor necessary to perform the following work:
  - 1. Drain the system to level necessary to complete the work;
  - 2. Fill the system to original fill pressure while venting excess air from the system;
  - 3. Provide all required water treatment, glycol, etc. to place system in its original condition.

#### PART 2 - PRODUCTS

## 2.1 MANUFACTURER'S AND SUB-CONTRACTORS LIST

A. Before ordering any material or equipment unit, and not later than ten (10) working days after signing of contracts, submit a list of Manufacturers, Sub-Contractors and Suppliers showing make, type, manufacturer's name and trade designation of all materials, and equipment,

proposed for use under this contract. Prepare list by reference to specifications. Identify all long lead submittals which will require an expedited submittal review.

- B. Refer to the Article "Proposal Preparation," in this section. Specifically designate the labor force required of the HVAC Trade Contractor. As part of the mobilization phase of the work, submit resumes for each Keyman including the Project Manager, Project Foreman and Sheet Metal Sketcher. The Sheet Metal Sketcher's resume must be submitted and approved by the engineer prior to the preparation of sheet metal shop drawings.
- C. These lists, when approved, will be supplementary to specifications, and no variations therefrom will be permitted except with the approval of the Engineer.
- D. Prepare the list using the "PROPOSED MANUFACTURERS AND SUB-CONTRACTORS LIST" located at the end of this section.
- E. Submittals will not be processed until the requirements of this Article are satisfactorily completed.

## 2.2 SUBMITTALS

- A. Provide digital submissions (.pdf format) for all material and equipment as noted in Proposed Manufacturer's and Sub-Contractors List, except where indicated otherwise herein.
  - 1. Prior to submission of product data, shop drawings, and samples, notify the Design Professional of any site conditions differing from those indicated or specified.
  - 2. Prior to submission of product data, shop drawings and samples to the design professional, the HVAC Trade Contractor shall submit all submittals which require electrical power to the Project Electrical Trade Contractor for the HVAC Trade Contractor's and the Electrical Trade Contractor's coordination and review. Electrical Trade Contractor shall provide approval of electrical power requirements for the HVAC Trade Contractor's proposed equipment.
  - 3. All submittals of equipment requiring electrical power must be accompanied by the "HVAC AND ELECTRICAL CONTRACTORS' COORDINATION OF HVAC EQUIPMENT ELECTRICAL REQUIREMENTS TRANSMITTAL COVER SHEET" located at the end of this section. Submittals without this Cover Sheet or an incomplete Cover Sheet will be rejected without review.
  - 4. All submittals must be accompanied by the "HVAC CONTRACTOR'S TRANSMITTAL COVER SHEET" located at the end of this section. Submittals without this cover sheet or with an incomplete cover sheet, will be rejected without review.
  - 5. All submittals must be accompanied by the "HVAC SUBMITTAL LOG", located at the end of this section. Submit log after final acceptance of the proposed Manufacturer's and Sub-Contractor's list. Revise and update the log with each submittal. Submittals without these logs or without an updated log will be rejected without review.
  - 6. Specifically annotate and sign all exceptions, deletions and additions that vary from the Project Contract Documents. Failing to provide signed annotations for all deletions and additions, recognize and accept that Contract Documents will govern, and will be used to resolve disputes.

- B. Prepare submittals by careful reference to: drawings and specifications; preparatory layout of all work; coordination with all proposed equipment; coordination with related submittals and the work of all other Trade Contractors; space requirements; and Utilities defined in this Section. A review of such submittals by the Design Professional, which include drawings, schedules, and catalog cuts provided by the HVAC Trade Contractor, his Sub-Contractors, manufacturers, and vendors, shall not relieve the HVAC Trade Contractor from the responsibility for correcting all errors of any sort in the submittals, either identified or undetected by such review.
- C. Regularly provide and update submittal log sheets listing submittal number, product, applicable specification section, dates of submittal and receipt and status. Identify each submittal by Job Name, log number and reference to applicable Specification Article number.
- D. All equipment submittals must include, but not be limited to, the following:
  - 1. Manufacturers' catalog designation, photographs and specifications.
  - 2. Full electrical data, including specifically, electrical characteristics.
  - 3. Full General Construction data, including operating weights, dimensional data including service access space. Data shall be given to the General Construction Trade Contractor, where applicable, for his use in setting steel, supports, and attachments.
  - 4. Full wiring diagrams, including clearly identified power connections and control connections. Data and diagrams shall be given to the Electrical Trade Contractor and Automatic Temperature Control (ATC) Trade Sub-Contractor for their use and inclusion into their submittals.
  - 5. Listing of specific HVAC performance, calculations and data.
  - 6. Dimensions, capacities, ratings, material and finish.
  - 7. Complete the submittal by listing all available options, accessories, configurations and materials, and legibly strike out with single thin line all proposed deletions. Clearly signify whether each and every manufacturer's option, accessory, configuration and material choice is included and which is excluded by the submission.
  - 8. Annotation of equipment, devices, systems as indicated by the Contract Documents (EF-1, AHU-2, etc.).
  - 9. Certification of testing by agencies such as ETL, ARI, UL, etc.
  - 10. Such other detailed information as required for proper evaluation.
- E. Review Time:
  - 1. Allow two (2) weeks after Design Professional's receipt for the Design Professional's processing of each submittal, exclusive of Owner's, or other's review in the processing chain. Allow a longer time period where processing must be delayed for coordination with subsequent submittals.
- F. Submittals for electric motor starters must include a tabulation listing the following:
  - 1. The equipment the starter is intended to control.
  - 2. Horsepower and starter size.
  - 3. Voltage.

- 4. Phase.
- 5. Full load amperes.
- 6. The manufacturer's number or type.
- 7. Heater numbers and amperage.
- 8. Quantity of auxiliary contacts required by ATC and fire alarm systems.
- 9. Pushbutton arrangement.
- 10. Pilot light arrangement if applicable.
- G. Submittals for automatic temperature controls must be coordinated with: 1) all HVAC equipment manufacturers' and vendors' submittals including review of HVAC submittals by ATC Sub-Contractor for conformance with sequences of operation for each piece of equipment; 2) all electrical requirements of ATC System with Electrical Trade Contractor; and 3) all fire and safety requirements of the Fire Alarm System. ATC submittals shall include copies of all wiring diagrams for all HVAC equipment with points of connections clearly identified. ATC submittals shall not be developed and submitted until HVAC Trade Contractor provides all equipment submittals for review.
- H. The Design Professional's recommendation of acceptance of the equipment proposed by the HVAC Trade Contractor is conditional upon the HVAC Trade Contractor fulfilling all obligations of the Contract Documents. By furnishing the proposed equipment, the HVAC Trade Contractor acknowledges compliance with all of the following:
  - 1. Field layout is completed and planning of proposed equipment has coordinated with all related submittals, related trades and space requirements.
  - 2. The HVAC Trade Contractor has reviewed and approved all submittals prior to submission. Provide all submittals with a signed approval stamp, signifying the following: 1) all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data have been verified; 2) the Design Professional has been notified of all site conditions which affect the work, and which require design resolution, as opposed to resolution by trade decisions; 3) all items are approved by the HVAC Trade Contractor, and have been coordinated and checked with other applicable submittals, and contract requirements; 4) submission is clearly marked to indicate which manufacturer's options are provided and which are not provided for the proposed equipment; and 5) manufacturers and/or equipment suppliers have been given a set of the contract documents for their review and use as the basis of the submittals.
  - 3. Any and all exceptions requested by the HVAC Trade Contractor are provided in writing with the submittals. All exceptions, deletions and additions that vary from the Contract Documents have been specifically annotated and initialed. Failing to provide initialed annotations for all deletions and additions, the HVAC Trade Contractor accepts the condition that the Contract Documents will govern, and will be used to resolve disputes.
  - 4. Submittals without the HVAC Trade Contractor's signed stamp of approval will be returned without review. Initialed approval stamps are not acceptable.
  - 5. The Design Professional's acceptance of the proposed equipment constitutes the Design Professional's formal approval that the engineering performance and operational utility requirements, of the proposed equipment, match the Design Professional's specified and designed performance requirements. By entering into this Contract, the HVAC Trade Contractor agrees that the purpose of submittals is to demonstrate to the Design Professional that the HVAC Trade Contractor understands the design concept and that

he demonstrates his understanding by indicating which materials and equipment he intends to furnish and install and use.

- I. Secure submittals smaller than 8-1/2 x 11 to paper of this size.
- J. Material and equipment fabricated, furnished and/or installed or used without the Design Professional's review are subject to rejection by the Design Professional.
- K. Prepare 1/4" minimum scale sheet metal shop drawings at the earliest practicable time and coordinate these drawings with the other Trade Contractors prior to erection or fabrication of the sheet metal work in order to effect timely resolution of all conflicts with the work of other Trade Contractors. Do not initiate sheet metal shop drawing preparation until the resume for the Sheet Metal Sketcher has been reviewed and approved by the Design Professional. See Article "Initial Application for Payment" in this section. Sheet metal shop drawings shall cover all metal work on the project, including but not limited to environmental air, exhaust air, make-up air, and products of combustion venting systems. Designate on sheet metal shop drawings all specified return air plenums, fire dampers, and smoke dampers. Designate all transfer air openings specified under General Construction, by reference to general construction drawings detailing fire rated assemblies, and smoke dampers. Refer to Article "Coordination Drawings," in Part 1 of this section.
- L. Corrections or comments made on submittals during review by the Engineer do not relieve the HVAC Trade Contractor from compliance with the requirements of the Contract Documents. Such review will be only for general conformance with the design concept, and the information given in the Contract Documents and does not include review of quantities, dimensions, sizing, pressure drops, weights or gauges, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the HVAC Trade Contractor. Review of a specific item does not indicate acceptance of an assembly of which the item is a component. The Design Professional is not responsible for any deviations from the Contract Documents that are not clearly noted by the HVAC Trade Contractor. The Design Professional will not review partial submissions or those for which submissions for correlated items have not been received. The HVAC Trade Contractor is responsible for: confirming and correlating all quantities, clearance, and dimensions; selecting fabrication processes and techniques of construction; coordinating work with all other Trades, and performing his work in a safe and satisfactory manner.
- M. All submittals must be able to be reproduced. The HVAC Trade Contractor is responsible for all reproduction and distribution to the General Construction Trade Contractor and all other Trade Contractors as applicable.
- N. If requested for the HVAC Trade Contractor's use in the preparation of submittals, an electronic copy (AutoCad .dwg format) of any of the HVAC Contract Drawings may be provided by the Design Professional, after receipt of a signed indemnification agreement, at a cost of \$250.00, paid in advance, to the HVAC Trade Contractor.
- O. For additional requirements regarding submittals, refer to Article "Additional Trade Contractor Paid fees and Expenses" in Part 3 of this section.

### 2.3 MATERIALS AND EQUIPMENT

- A. All materials and equipment must be new and conform to the grade, quality and standards specified herein.
- B. All equipment offered under these specifications is limited to products regularly produced and recommended for service ratings in accordance with engineering data or other comprehensive literature made available to the public and in effect at the time of opening of bids. Testing agency seals, decals and/or nameplate shall be attached to and visible on all equipment.
- C. Items such as valves, motors, starting equipment, vibration isolating devices, and all other equipment and material, where applicable and practicable, must each be of one manufacturer.
- D. Install equipment in strict accordance with manufacturer's instructions for type and capacity of each piece of equipment used. Obtain these instructions, which will be considered part of these specifications. Type, capacity and application of equipment must be suitable and operate satisfactorily for the purpose intended in the HVAC systems.

## 2.4 EQUIPMENT VARIATIONS AND SUBSTITUTIONS

- A. Equipment Substitution Definition as follows:
  - 1. A product that is neither the Basis of Design, nor one of the named Alternative Manufacturing Sources.
  - 2. Unless noted otherwise in the Contract Documents, substitutions may be considered after the award of Contracts. Subsequent requests will be considered only when, through no fault of the HVAC Trade Contractor, none of the specified products are available.
- B. Equipment Variation Definition as follows:
  - 1. A product that is not the Basis of Design, but is named as one of the specified Alternative Manufacturing Sources.
- C. The manufacturers listed in Part 2 of all technical specifications are considered Alternative Manufacturing Sources as described in Paragraphs A and B above.
- D. "Subject to compliance", as used in these specifications, means compliance with all the requirements of the Contract Documents.
- E. The materials and products mentioned in these Contract Documents are specified to establish a standard of: material of manufacture; independent testing agency certifications; quality; function; design; and performance. The phrases "Basis of Design," "standard of design," and "equivalent acceptable," are used to indicate that other similar, comparable products may be used provided such substitutes or variations are accepted by the Design Professional as meeting all the salient characteristics and standards necessary, such as: material of manufacture; independent testing agency certifications; quality; function; design; and

performance, to meet the Owner's needs and meet the objectives of the Design Professional's Project Design.

- F. Where Alternative Manufacturer Sources are listed for an item:
  - 1. Selection must be either the Basis of Design or one of those listed Alternative Manufacturing Sources.
  - 2. There is no guarantee implied that each and every manufacturer listed can meet or exceed the salient characteristics, such as: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as Basis of Design.
- G. Each Trade Contractor is responsible to contact his proposed equipment manufacturer's representative and confirm, prior to preparing submittals, the proposed manufacturer's product meets or exceeds the: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design. Final acceptance will be determined by the Design Professional, whose decision is final.
- H. Submittals offered as an Equipment Variation from the Basis of Design shall include a letter, on the product manufacturer's letterhead, certifying that the proposed product is a Comparable Product to the product specified as the Basis of Design and conforms to all the salient characteristics, including: material of manufacture; quality; function; design; and performance of the product specified as the Basis of Design. If directed by the Engineer for Products offered as an Equipment Variation, the Offerer shall provide a Letter of Confirmation from a Registered, Professional Engineer attesting that the Proposed Equipment Variation conforms to all the salient characteristics, including: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design.
- I. Specific products specified without use of the term: equivalent(s); comparable products; or substitutions constitute a proprietary specification, and must be provided as specified, unless a written request is submitted to the Design Professional for approval up to ten (10) days after the date of project award. Such requests must include a complete description of the proposed product, along with sufficient documentation and other information necessary for a complete evaluation of the proposed product. Such Trade Contractor Requests shall include a letter, on the product manufacturer's letterhead, certifying that the proposed product is a Comparable Product and conforms to all the salient characteristics, including: material of manufacture; independent testing agency certifications; quality; function, design; and performance of the specified product. If approved, the proposed product will be listed in an addendum to notify all bidders that such acceptance has been granted by the Design Professional. If not approved, provide the specified product.
- J. Provide Calculations, signed and sealed by a Professional Engineer registered in the State in which the work is taking place, engaged by the HVAC Trade Contractor, confirming that the equipment proposed as either a Substitution, or Variation, is a Comparable Product to the product specified as the Basis of Design and conforms to all the salient characteristics, including: material of manufacturer; independent testing agency certifications; quality;

function; design; and performance of the product specified as the Basis of Design. Provide such calculations for major pieces of equipment (boilers, air handling units, chillers, etc.). The Engineer, whose decision will be final, will determine which products will require calculations during the submittal review process.

- K. The Contract Documents have been founded upon Engineering Design selection of materials, products, and pieces of equipment listed at the Basis of Design. In the event that the incorporation of an approved Substitution, Variation, or assembly, into the work, requires revisions or additions to the contractual requirements of either the Trade Contractor proposing the substitution or variation, or any other Trade Contractor, the Trade Contractor proposing the substitution or variation, shall bear the cost of: such revisions or additions to the work of the Trade Contractor proposing such Substitution and/or Variation; any expenses of all affected trades; and all engineering or architectural services required at no change in the contract sum.
- L. The equipment specifications indicated on the drawings, or in Part 2 of each of the technical specifications, may or may not indicate or include all of the required salient characteristics, components and accessories included with the specified product. Include cost for all such characteristics, components and accessories required to meet or exceed the: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design.
- M. For requirements regarding equipment variations after bid award, refer to Article "Additional Trade Contractor Paid Fees and Expenses" in Part 3 of this section.
- N. Each Trade Contractor negotiating for pricing advantages affecting the Trade Contractor's Bid shall comply with the directives included herein, bear full responsibility for the accuracy and completeness of the submissions required of the Vendor selected by the Trade Contractor. The Proposing Trade Contractor shall bear full responsibility for all extra costs of the Design Professional shown to have resulted from inaccurate, and/or incomplete compliance with the directives included in this Specification Article.
- O. All decisions provided by the Design Professional, described herein, shall be final.

## 2.5 VIBRATION ELIMINATION

- A. Provide vibration isolation support provisions for all moving or rotating equipment, machinery and transformers when such provisions are not furnished and/or integrally mounted by the equipment manufacturers. Install in accordance with vibration isolation manufacturer's recommendations unless specified otherwise herein.
- B. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Amber/Booth Company;
  - 2. Korfund Company, Inc.;
  - 3. Mason Inc.

- C. Provide all rotating or moving machinery or equipment mounted on, or suspended from, building structure with approved resilient suspension isolation mountings.
- D. Provide vibration isolating connections between all pumps and connecting piping. Length, size, and stiffness as recommended by vibration isolator manufacturer.
- E. Use flexible metallic conduit for all electrical connections to moving or vibrating equipment, such as motors, pumps, fans and the like.
- F. Rigid pipes, ducts, conduit or other extended machine assemblies connected to vibration isolated equipment are not permitted to be tied in directly with the building construction. Connect such elements to the equipment through flexible fittings, and support using isolating equipment as required.
- G. All systems must operate free from objectionable vibration and noise. Take all necessary steps required to achieve this result without additional cost to the Project.

## 2.6 INSERTS, HANGER SUPPORTS, CLAMPS, FASTENINGS

- A. All materials, designs and types of inserts, hanger supports and clamps must meet the requirements of the latest edition of the Manufacturers Standardization Society Document MSS-SP-58, Underwriters Laboratories, Inc., National Electrical Code and Factory Mutual Engineering Division Standards where applicable. Insert, hanger support and clamp types referenced herein are shown in MSS-SP-58.
- B. Provide all necessary inserts, hanger supports, fastenings, clamps and attachments necessary for support of the HVAC work. Select the types of all inserts, hanger supports, fastenings, clamps and attachments to suit both new and existing building construction conditions specifically for the purposes intended.
- C. Clamps and attachments to steel beams and bar joists must be made using types 20, 21, 23, 25, 27, 28, 29 or 30 as applicable to suit conditions of construction. Clamps and attachments must be selected on the basis of the required load to be supported. Provide all necessary steel angle iron or channel between bar joists, or steel beams where direct attachment cannot be made. Holes are not permitted to be drilled or burned in structural building steel for hanger rod supports. Welding of hangers or supports to structural steel is prohibited unless approved beforehand by a Structural Engineer.
- D. Provide metallic masonry anchors for all pre-cast concrete, masonry and cast concrete construction. Locate in pre-cast and cast-in-place concrete as directed by the Design Professional. Select and install as recommended by the anchor manufacturer for the various applications, stresses and services involved. Installation of masonry anchors must be accomplished by pre-drilling concrete or masonry to diameters and depths required to properly accommodate anchor bolts.
- E. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Dynabolt;

- 2. Ram-In;
- 3. Tru-Bolt;
- 4. Redhead;
- 5. Hilti;
- 6. Wej-it.
- F. Toggle bolts may be used in dry wall and lath and block plaster walls. The use of toggle bolts is restricted to the weight limitations imposed by the toggle bolt manufacturer for the size used.
- G. Except where noted otherwise herein, attachment to wood or material of similar fibrous nature must be made with lag screws and/or wood screws of required size.
- H. Screws with wooden or plastic plugs, or lead anchors are not acceptable.

## 2.7 PIPING AND CONDUIT SLEEVES

- A. Provide all sleeves required for HVAC work and be fully responsible for the final and permanent locations thereof.
- B. Provide sleeves in the following locations:
  - 1. All pipes and conduits passing through all cast-in-place concrete construction and masonry walls.
  - 2. All pipes and conduits passing through cast-in-place waterproof concrete construction and waterproof masonry walls.
- C. Extend through construction and finish flush with each surface except where noted otherwise. Provide for a minimum ½" clearance around conduit, pipe or its covering in the instance of pipe covered with insulation.
- D. All sleeves in waterproof walls and floors must be fitted and sealed with positive hydrostatic mechanical seals. Sleeves must be sized accordingly. Mechanical seals must be placed around piping and/or conduit and inserted into void between inner wall of sleeve and piping and/or conduit. Tighten mechanical seals as required for watertight seal.
- E. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Thunderline Corporation;
  - 2. Advance Products and Systems, Inc.;
  - 3. Proco Products, Inc.
- F. All sleeves must be Schedule 40 steel pipe finished with smooth edges. Sleeves in waterproof walls and floors must be fabricated with minimum 1/4" thick rectangular steel plate placed around mid-point of sleeve, continuously welded to sleeve and then place the entire/plate assembly into proper position prior to erection of walls and floors. Otherwise, provide sleeves with a minimum of three (3) lugs for anchoring.

- G. Pack voids between sleeves, piping or conduit, where located in fire or smoke rated assemblies, in accordance with UL Fire Resistance Directory.
- H. Set all sleeves prior to or during erection of walls and floors. In the event that sleeves are omitted or incorrectly located in new walls or slabs, submit a location plan and method of cutting and installing sleeves to the Design Professional for review prior to carrying out the work.
- I. If sleeves are omitted or located incorrectly, the particular Trade Contractor who is at fault, at his own expense, must engage the trade which originally installed the work, to cut and patch to the satisfaction of the Design Professional.
- J. Provide mechanical seals and insert into voids between piping and conduits that pass through floors, and which will be exposed in finished areas that have floor drains, including spaces classified as "Janitors Closets," "Toilet Rooms," and the like.
- K. Where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine, such as a masonry saw or core drill, to insure a neat hole.

## 2.8 SMOKE/FIRESTOPPING (MATERIALS)

- A. Firestopping materials and systems must consist of commercially manufactured products complying with the following minimum requirements and be asbestos and PCB free:
  - 1. Flame Spread Index: Twenty-five or less when tested in accordance with ASTM E 84.
  - 2. Smoke Density Index: Fifty or less when tested in accordance with ASTM E 84.
  - 3. Nontoxicity: Nontoxic to human beings at all stages of application and during fire conditions.
  - 4. Systems shall comply with Underwriter's Laboratory Listing Requirements.
  - 5. Fire Resistance:
    - a. Materials and systems used to seal penetrations in time rated assemblies must be capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E 119 time temperature fire conditions for 3 hours.
    - b. Materials must not require a rise in temperature to install or activate seal.
    - c. Materials must not contain solvents or require hazardous waste disposal.
    - d. Firestop material must not dissolve in water after curing.
- B. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Rectorshield, Inc.;
  - 2. Hilti;
  - 3. 3M.
- C. Smoke stopping materials must be approved by the authority having jurisdiction.

### 2.9 COMPRESSORS

- A. For all equipment equipped with refrigerant compressors, provide equipment, options, and accessories (cylinder unloaders, multiple compressors, etc.) to achieve the maximum number of cooling steps available for the particular piece of equipment.
- B. Include the required equipment, options, and accessories in the bid proposal. Extras for these items after the submission of bids will not be considered.

## PART 3 - EXECUTION

### 3.1 METHOD OF PROCEDURE

- A. The drawings accompanying these specifications are diagrammatic and intended to cover the approximate and relative locations of the building systems.
- B. Installation, connection and interconnection of all components of these systems must be complete and made in accordance with the manufacturers' instructions and best trade practices.
- C. Erect all parts of equipment furnished at such time and in such manner as not to delay or interfere with other Trade Contractors and their work.
- D. Plug all piping, conduit and ductwork as required during construction to prevent entering of dirt.
- E. Before material is ordered or fabricated, or any work is performed, verify all calculations, sizing, measurements, including lines, grades, pipes, conduit and ductwork elevations at the building, as applicable, and be responsible for the correctness thereof. No extra compensation will be allowed on account of differences between actual dimensions, routing and measurements and those indicated in the Contract Documents. Any discrepancies discovered must be submitted to the Design Professional for consideration before proceeding with the work.
- F. Lay out work and be responsible for the establishment of heights, grades, and the like, for all interior and exterior equipment and systems as applicable, including piping, drains, fixtures, conduit, ductwork, and the like, included in Contract Documents, in strict accordance with the intent expressed thereby; and all the physical conditions to be met at the building and finished grade, and be responsible for accuracy thereof. The establishment of the location of all work must be performed in consideration of the finished work. In case of conflict, equipment and/or materials must be relocated without cost to the Project, as directed by the Design Professional, regardless of which equipment was installed first. Refer to Article, "Coordination Drawings", in Part 1 of this section.
- G. Cooperate with other Trade Contractors for the proper securing and anchoring of all work included within these specifications. Use extraordinary care in the erection and installation of all equipment and materials to avoid marring surfaces of the work of other Trade Contractors,

as each Trade Contractor will be held financially responsible for all such injury caused by the lack of precaution and due to negligence on the part of his workmen.

- H. All piping, ductwork, conduit and other materials and equipment shown to be mounted below ceilings are to be kept as close to ceiling areas as possible unless otherwise noted.
- I. Install and arrange all equipment, such as valves, air vents, dampers, cleanouts, traps, junction boxes, and the like, which will be concealed in construction, to be fully accessible for adjustment, service and maintenance. Furnish access doors where required for installation under the General Construction Contract, where applicable. Otherwise, furnish and install all required access doors.

## 3.2 **PROTECTION OF WORK**

- A. All piping, equipment, materials and accessories having polished or plated surfaces, machined finishes or unpainted surfaces must be given a thick coat of a neutral protection grease and carefully covered with thick cloth or heavy building paper held securely in place to protect the finish against damage during the entire period of construction. Protect equipment by the use of canvas tarps, vinyl sheeting or similar materials held securely in place.
- B. Seal all openings in pipes, fittings, ductwork, conduit and all other materials to exclude dirt, sand, and other foreign materials.
- C. Exercise every precaution to exclude dust, dirt and all other foreign materials from switchgear rooms, transformers, and all mechanical equipment rooms during construction. Rooms and equipment contained therein must be swept vacuum cleaned at regular intervals. All relays, meters and HVAC equipment containing electrical components must be protected with heavy paper held in place with approved mastic tape to exclude fine dust and particles. Install and maintain sufficient electric heaters in equipment rooms and transformer compartments to keep equipment dry during construction.

#### 3.3 CUTTING AND PATCHING

- A. For existing construction:
  - 1. The General Construction Trade Contractor, where applicable, will perform all cutting and patching required for the work of all trades.

## 3.4 CONCRETE AND MASONRY

- A. Provide all cast-in-place concrete, pre-cast concrete and masonry work (brick and block) required for completion of the HVAC work, including interior and exterior concrete slabs.
- B. Design Professional will review and approve materials used.

- C. Unless shown or specified otherwise, all equipment foundations and housekeeping pads must be six inches (6") minimum height from floor, of sufficient mass, and secured to the floor.
- D. Refer to the general construction contract documents for concrete specifications.
- E. Unless noted otherwise, concrete bases must be 4" larger than the largest dimension of the base of the supported equipment in both directions. Use 3000 psi, 28 day compressive strength concrete and reinforcement.

### 3.5 SUPPORTS

- A. Except where noted otherwise in the specifications and shown on drawings, provide all materials, including, but not limited to, equipment supports, supplies and labor necessary as required to adequately support, brace and strengthen new and/or existing equipment and materials installed under/or affected by the HVAC work.
- B. The design, materials, fabrication and erection of structural steel supports must conform to "Specification for Design, Fabrication and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction, "Code of Standard Practice for Steel Buildings and Bridges". Welding, where required, must conform to "Code of Arc and Gas Welding in Building Construction" of the American Welding Society.

### 3.6 LINTELS

- A. Lintel work to be performed in strict accordance with the general construction contract documents. Refer to the general construction contract documents for lintel schedules and details.
- B. Where lintels are not indicated as being provided by General Construction or Structural Trade Contractors, the HVAC Trade Contractor must provide lintels required for the installation and completion of HVAC work.

#### 3.7 ESCUTCHEONS

- A. Except as noted otherwise, provide heavy solid pattern, steel, cast iron or malleable iron escutcheons with set screws and prime coat of paint on all uninsulated piping and conduit exposed to view within structure where passing through floors, partitions, walls or ceilings. Escutcheons are not required in equipment rooms, boiler rooms or other unfinished areas.
- B. For piping with sleeves extending above floor, provide escutcheons with deep recesses.
- C. Provide solid pattern, smooth chrome plated cast brass escutcheons for all chrome plated pipe fixture connections.
- D. Provide nickel plated cast iron escutcheons where pipes pass through toilet rooms, walls or ceilings.

E. Provide collars of angle fabrication for duct passing through floors, walls and ceilings in finished areas.

### 3.8 MACHINERY GUARDS

- A. Provide OSHA approved expanded sheet steel metal guards over all belt drives, couplings and other moving equipment to protect personnel from injury.
- B. Machinery guards shall comply with OSHA Standards 29 CFR STANDARD NUMBER 1910.212 General Requirements for all Machines; Subpart Number 0; Subtitle - Machinery and Machine Guarding; STANDARD NUMBER 1910.219; Standard Title - Mechanical Power - Transmission Apparatus; Subpart Number 0; Subpart Title - Machinery and Machine Guarding.

#### 3.9 ROOFING WORK

A. Existing roofing and flashing is under Manufacturer's and Installer's Warranties. HVAC Trade Contractor shall have all roofing and flashing work performed by warranted roofing installer. Contact Owner or original installer for further information. New penetrations through the roof shall be in full warranty condition. If required by the roof warranty, engage the original roofing installer to perform all roofing and flashing work. Refer to the general construction contract documents of these specifications.

### 3.10 PAINTING AND FINISHING

- A. All painting, generally, will be provided by the General Construction Trade Contractor, where applicable, except where specifically noted otherwise in the HVAC Specifications. Otherwise, each Trade Contractor is responsible for his own painting and finishing.
- B. Equipment and material furnished with factory enamel finish will not be painted unless finish has been damaged, in which case the equipment or material must be refinished by the Trade Contractor who furnished it, to the satisfaction of the Design Professional.

### 3.11 LUBRICATION

- A. Provide proper and necessary lubrication of any items of operating, rotating or moving equipment which is furnished, installed or which must operate as part of the HVAC system.
- B. When an item of operating equipment is furnished and installed by a Trade Contractor, it will be his responsibility to accomplish the lubrication.
- C. When an item of operating equipment is furnished by one Trade Contractor and installed by another, it is the responsibility of the Trade Contractor furnishing the equipment to apply the lubricants.
- D. All rotating or moving equipment must be lubricated prior to energizing and operating the equipment. Should the Trade Contractor responsible for the lubrication fail to apply lubricants

prior to initial start-up and the equipment is damaged as a result of his negligence, that Trade Contractor is required to provide all corrective action necessary including replacement, if required, for the proper operation of equipment.

- E. Lubrication must be accomplished in the manner prescribed or recommended by the manufacturer of the specific item. For motor driven equipment this precaution of lubrication will apply individually to the driver and the driven.
- F. The lubricants must be of the type, grade, specification and manufacture as prescribed or recommended by the manufacturer of the specific equipment item.
- G. Extend lubrication fittings where required to allow maintenance personnel to lubricate the equipment easily and efficiently.
- H. The Trade Contractor who supplies any item of rotating equipment will have the responsibility of securing written instructions on the lubricating procedure and must furnish not less than one year's supply of all necessary lubricants properly identified so they can be replaced.
- I. Any moving or rotating equipment furnished by the Owner that is to be installed, reused and/or serviced must also be lubricated. Except where noted otherwise in the Contract Documents, the Trade Contractor installing, reusing and/or servicing all such equipment is responsible for the proper lubrication thereof, including obtaining proper lubricating instructions from the various manufacturers involved, furnishing and applying the necessary lubricants and leaving the Owner with a one (1) year supply of lubricant.

## 3.12 HVAC TRADE - ELECTRICAL TRADE COORDINATION

- A. Furnish equipment with electrical current characteristics as shown on electrical drawings and specifications.
- B. The nameplate voltage of all motors furnished with mechanical equipment must be within the range of the voltage shown for use with the motor as the upper limit, and 5% less than this voltage as the lower limit.
- C. HVAC Trade Contractor must furnish all motors, motor starters, specialty motor controllers, float and pressure switches, temperature control, other special automatic controls as indicated in the Contract Documents for all equipment furnished and/or installed under the HVAC contract except where noted otherwise.
- D. All electrical equipment furnished by the HVAC Trade Contractor must be as recommended by the equipment manufacturers, in accordance with the Electrical Specifications for similar items, and of such type as to work properly with automatic temperature control sequences where required.
- E. The Electrical Trade Contractor will provide all push-buttons, safety switches for motors, and wiring from starters to motors and install all starters furnished to him by the HVAC Trade Contractor unless otherwise indicated in the Contract Documents.

- F. Where controllers and/or starters are furnished as an integral part of any equipment, the Trade Contractor supplying the equipment must furnish complete wiring between controllers, starters and motors.
- G. The Electrical Trade Contractor must provide disconnect switches for all equipment furnished and/or installed by other Trade Contractors, except where such switches are an integral part of equipment.
- H. HVAC Trade Contractor must set all motors and furnish, set and pipe as necessary, float switches, temperature control and other special automatic temperature controls.
- I. HVAC Trade Contractor must provide all power and control wiring required by his respective section of the specification. The Electrical Trade Contractor will provide all other wiring required for the completion of the work of the HVAC Trade Contractor.
- J. HVAC Trade Contractor must furnish the Electrical Trade Contractor with complete wiring diagrams as required.
- K. Any electrical work performed by the HVAC Trade Contractor must be performed in accordance with the requirements of the ELECTRICAL Section of these specifications.
- L. For additional coordination items, refer to Article 2.2, "Submittals".

### 3.13 ELECTRICAL MOTORS AND STARTERS

- A. All motors furnished by all Trade Contractors, unless specified to the contrary in Contract Documents, must conform to the following requirements:
  - 1. Characteristics, dimensions, tolerances, temperature rise, insulation, rating, noise, vibration, and all other characteristics in accordance with the latest standards of IEEE or NEMA.
  - 2. Unless required by the driven unit, motors must have normal starting torque, NEMA Design B characteristics. Horsepower rating of motor must be equal to or greater than that required by driven equipment. Current density design of motor rating must be limited so that overload protection provided by standard motor starters will be adequate to prevent damaging overheating during stall, single phasing or slightly prolonged acceleration.
  - 3. Use NEMA Class A or B insulation with motor frames amply sized to provide a 1.15 service factor at an ambient of 40 deg. C maximum. Insulation systems must be designed for an average life of 60,000 hours.
  - 4. All motors must be high efficiency. Meet or exceed requirements in NEMA Standard MG1, Table 12-10.
  - 5. Running power factor must be higher than 0.85 for motors 5 HP to 30 HP.
  - 6. Each motor must be mounted on the same bedplate as the equipment driven and be complete with pulleys, slide rails or flexible couplings as required.
  - 7. Each Trade Contractor is responsible in each instance for the proper selection of motors of suitable characteristics with details submitted for approval to the Design Professional prior to installation.

- B. All starters furnished by all Trade Contractors must conform with the following requirements, unless specified to the contrary in the Contract Documents:
  - 1. All starters for 3-phase equipment must be fully enclosed, across-the-line type equipped with solid state overload protection as herein specified for all three phases, low voltage protection, all necessary auxiliary contacts as required and indicating pilot lights. Starters which are controlled automatically must have two-wire control with "ON-OFF-AUTO" switches. Starters which are controlled manually must have 3-wire control with Start-Stop pushbuttons.
  - 2. All 3-phase starters remotely controlled must have 120 volt coils and control transformers with disconnecting means. Starters for single phase motors shall be manual toggle switches with thermal overload protection and pilot light. Omit pilot light for unit heaters.
  - General Purpose NEMA-1 enclosure for indoor use under normal atmospheric conditions. Watertight enclosure NEMA-4 or NEMA-5 for outdoor use or where starters are subjected to the splashing or dripping of water. Explosion-proof enclosure NEMA-7, 9 or 12 for dusty or hazardous locations as required by Article 500 of the National Electrical Code.
  - 4. Individually equip all starters for three phase motors with solid state adjustable overload protection with automatic protection to prevent single phase operation with the following features:
    - a. Three phase, self-powered with current sensing, phase unbalance and phase loss protection, visible trip indication, trip test function, and power "LED."
    - b. Phase loss protection to include automatic restart with a selectable manual switch.
- C. All controllers, starters and other electrical components furnished as an integral part of any apparatus must be furnished complete with integral wiring as required.
- D. So far as is practical, all motors and starters must be of one manufacturer.
- E. Subject to compliance with the requirements, provide products by one of the following:
  - 1. General Electric Co.;
  - 2. Westinghouse Co.;
  - 3. Square-D Co.;
  - 4. Allen-Bradley Co.
- F. Submittals for motors and starters must be coordinated with Electrical Trade Contractor.

## 3.14 ELECTRICAL PROVISIONS FOR PACKAGED HVAC EQUIPMENT

- A. Unless otherwise noted in HVAC Specifications, all packaged equipment furnished by HVAC Trade Contractor must be complete with the following electrical provisions:
  - 1. General compliance with provisions of the preceding Article, ELECTRICAL MOTORS AND STARTERS.

- 2. Starting electrical characteristics of all motors and/or starters must be approved by local utility company and Design Professional.
- B. Approved, factory installed and wired starting, operating and control equipment, terminating in terminal strip for single point power wiring connections by Electrical Trade Contractor must conform with the ELECTRICAL Section of these specifications and must include approved branch fuses for branch power circuits.

## 3.15 PIPING AND EQUIPMENT IDENTIFICATION

- A. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Seton Nameplate Corporation;
  - 2. Marking Services, Inc.;
  - 3. Brady Worldwide.
- B. Pipe markers must comply with OSHA Standards. Wording and color coding must conform to the current edition of ANSI/ASME A13.1.
- C. Mark all systems of piping with markers 12 foot maximum centers.
- D. Markers must indicate the following:
  - 1. Pipe contents in legend form.
  - 2. Size of piping.
  - 3. Direction of flow in piping.
- E. Identify all valves, controls, dampers and other parts of HVAC systems by means of 2" round brass, aluminum or plastic tags. Tags must have engraved or stamped letters or numbers ½" high. Fasten tags securely with brass "S" hooks or chains.
- F. Provide ½" scale diagrams showing location, number and service or function of each tagged item. Frame diagrams in approved frame with clear Lucite front, secured to walls in location as directed by Owner. Provide two (2) separate copies of each diagram, permanently framed and covered as two (2) separate items.
- G. Identify all equipment as to nature, service and purpose by means of permanently attached plastic nameplates having ½" high letters, dull black outside and white core. Nameplates of approved size, beveled edges and engraved through black to white core. Nameplates shall indicate equipment identification names and numbers as approved by the Owner.

#### 3.16 ABANDONMENT, REMOVAL AND RELOCATION

A. Perform all abandonment, removal and relocation work required for completion of HVAC systems.
- B. Removals shown on drawings are a general indication only, and may not necessarily indicate the full extent of removals which may be required to complete this work.
- C. Where existing partitions, walls, ceilings and floors are to be removed, all ducts, piping, conduits, materials and equipment attached or fastened thereto or within, as applicable, must be carefully removed.
- D. Where work under this contract interferes with the existing construction, ductwork, piping, conduit or equipment, remove all such materials and route new work to clear the obstruction. Provide additional piping, conduits, ducts, and material of the same design and quality if the piping and/or conduit is to be continued in use.
- E. Disconnect and remove all accessible piping, conduit, ductwork, materials, fixtures and equipment not required in the new systems. Plug all outlets at the main or riser connection.
- F. Removed materials not desired by the Owner and not to be reset and not specified nor indicated to be reused, become the property of the HVAC Trade Contractor and must be promptly removed from site.
- G. All demolition work is subject to the direction and approval of the Design Professional and must be performed in such manner as not to interfere with the normal operation of the building.
- H. Relocate existing utilities and/or equipment that must remain to maintain operation of building or parts of building outside the work area.

#### 3.17 SMOKE AND FIRESTOPPING (METHODS)

- A. Installation of materials must be performed by applicator/installers qualified, trained and approved by the manufacturer of the materials, and be installed in accordance with ASTM E 814.
- B. Install smoke and firestopping at locations required, shown, or specified in accordance with applicable codes, manufacturer's written instructions, and test report, applying to the specific trade equipment as applicable. Cutting and patching of construction and providing sleeves, where required, is shown on drawings or specified in other sections.
  - 1. Filling of Voids: Smoke and firestopping materials must completely fill void spaces regardless of geometric configuration, subject to tolerances established by the manufacturer. Smoke and firestopping for filling voids in floors in which the smallest dimension of the void is 4 in. or more must support the same load as the floor is designed to support or must be protected by a permanent barrier to prevent loading or traffic in the smoke or firestopped areas.
  - 2. Insulated Ductwork and Pipes: Insulated equipment penetrating rated floors and walls must be insulated with materials which provide the same performance as the smoke and firestopping material. This material must extend a minimum of 6 in. on each side of the opening. Vapor barrier of such insulation must have a perm rating of 0.03 maximum.

- 3. Electrical Cables or Conduits: Smoke and firestopping at penetrations of electrical cables or conduits must comply with the requirements of NFPA No. 70.
- 4. Where smoke and firestopping of penetrations in floors, walls and partitions that will be exposed in completed construction, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and provide escutcheons or other trim.
- 5. Schedule the installation and required inspection of smoke and firestops for penetrations that will be concealed in completed construction prior to erection of floors, walls, and partitions that would permanently conceal the penetrations.
- C. All areas of smoke and firestopping installation must be accessible until inspection by the applicable code authorities.

# 3.18 SUBSURFACE CONCEALED UNKNOWN PHYSICAL CONDITIONS

- A. Subsurface, or otherwise concealed physical conditions which (1) do not differ materially from those indicated in the Project Contract Documents; (2) affect HVAC work; (3) do not differ materially from those ordinarily found to exist, and which are generally recognized as inherent in HVAC construction activities of the character provided for in the Project Contract Documents, are to be anticipated by the HVAC Trade Contractor, and included in the basic HVAC work.
- B. Unknown physical conditions: which are of an unusual nature; which are materially different in subsurface (otherwise concealed) physical conditions; which affect the HVAC work; which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character found in the Project Contract Documents, are the basis for and require notice by the applicable building trade, promptly, before such conditions are disturbed. Such conditions may become the basis for a legitimate claim under "Changed Conditions," affecting the cost, and/or schedule of the work. During the work, the HVAC Trade Contractor shall provide reasonable, incidental on-site review, survey and measurements to assist in quantification of such conditions.

# 3.19 CONCRETE PATCHING (PROCEDURE)

- A. Remove any loose debris, chipped or cracked portions of concrete, and any grease, oil, dirt or other coating materials from the concrete to be patched.
- B. Apply epoxy bonding adhesive to the clean dry surface with a brush or roller to briefly flood the surface allowing good penetration, if completely absorbed, apply additional material. Refer to the general construction contract documents of these specifications.
- C. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Edison Coatings Inc.;
  - 2. Sika Corp.;
  - 3. Euclid Chemical Co.

- D. Apply new cementitious mortar patch to surface immediately after applying bonding adhesive, bonding agent should be wet while applying concrete patch. Mortar patch equal to Moxie International 2000 Super Patch. Comparable product by Sika Corp., Euclid Chemical Co., or approved equal may be submitted for review. Refer to Division 03 of these specifications.
- E. Work patch into any cracks or crevices with a brush, then apply remainder of patch and trowel until level and smooth.
- F. Do not apply patch below 45 deg. F.

# 3.20 TEMPORARY PARTITIONS

A. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas. Refer to Division 01 of these specifications.

# 3.21 INITIAL APPLICATION FOR PAYMENT

- A. Provide the following prior to the initial application for payment:
  - 1. Copy of the HVAC Trade Contractor's and Sub-Contractors' license for the state in which the work is being performed.
  - 2. Resumes for the designated Project Manager and Project Foreman.
  - 3. Resume for the Sheet Metal Sketcher. This resume must be provide in advance of the initiation of preparation of sheet metal shop drawings.
  - 4. List of independent agencies who will be engaged by the HVAC Trade Contractor to perform tests, provide certifications, conduct inspections, etc. as required by Contract Documents.
- B. The initial application for payment will not be processed until the items above are submitted.
- C. Include line items for:
  - 1. TAB report.
  - 2. Coordination Drawings
  - 3. Provide breakouts for work at multiple buildings, floors and/or areas of building.

# 3.22 FINAL APPLICATION FOR PAYMENT

- A. Provide the following prior to the final application for payment:
  - 1. Refer to the general construction contract documents of these specifications.
  - 2. Pipe Pressure Test Reports.
  - 3. Equipment Start-Up Reports for each piece of HVAC equipment.
  - 4. Operation and Maintenance Manuals and Data.
  - 5. Testing, Adjusting and Balancing Report for HVAC systems.
  - 6. HVAC system and equipment warranties.

- 7. HVAC Contractor's Punch List of incomplete work items with reason why each work item is not complete and anticipated schedule for completion. Submit at least one week prior to Engineer's final Construction Observation Report site visit.
- 8. HVAC Trade Contractor's notarized certification letter.
- 9. As-built drawings as described in Part 1 of this specification section.
- B. Final payment is contingent upon completion of all items listed above.

# 3.23 ADDITIONAL HVAC TRADE CONTRACTOR PAID FEES AND EXPENSES

- A. As a material part of the HVAC Trade Contractor's Agreement to complete the work of this Contract, the HVAC Trade Contractor agrees to reimburse Gillan & Hartmann, Inc. ("Design Professional") for the below listed extra engineering work under the following conditions:
  - 1. Design Professional's hourly billing rate shall be \$250.00 per hour for all related office hours, travel time and as applicable, on-site time;
  - 2. HVAC Trade Contractor's request(s) for substitution;
    - a. When such requests for substitution are not the result of a bonafide delivery problem or design related problem, and;
    - b. When such requests do not address items of equipment for which the specifications list the basis of design with at least one comparable product, and;
    - c. The HVAC Trade Contractor's request(s) for substitution must be submitted in writing, and;
    - d. The HVAC Trade Contractor agrees to compensate the Design Professional \$1,500.00 for the review of each proposed substitution;
    - e. The HVAC Trade Contractor shall render written acceptance of the Design Professional's extra charges, and;
    - f. Any balance not paid will be deducted from contractors' final payment.
  - 3. Extra Design Professional work created by the HVAC Trade Contractor's multiple submissions of a single material or piece of equipment;
    - a. The Design Professional's basic services include two reviews for each piece of equipment or material submittal. The Design Professional's first review takes place at the initial HVAC Trade Contractor's submission of that submittal. The Design Professional's second review takes place when the Design Professional requires a resubmission of that submittal.
    - b. If the Design Professional's third review of a particular submittal is required for reasons due to the HVAC Trade Contractor, the Trade Contractor agrees to compensate the Design Professional \$1,500.00 for each submittal review.
    - c. Any unpaid balance due will be deducted from the Trade Contractors final payment.
  - 4. Extra work created by the HVAC Trade Contractor resolution of substantial completion and final completion construction observation reports and project closeout documentation:

- a. The Design Professional's basic services rendered to the Owner include periodic visits to the site and providing written list of items (Construction Observation Report) requiring the HVAC Trade Contractor's attention, reporting and resolution;
- b. The HVAC Trade Contractor shall provide written feedback and prompt resolution of Construction Observation Items including a written schedule for the HVAC Trade Contractor's completion of these Items followed by a written confirmation of closure;
- c. The contract documents specify the HVAC Trade Contractor's requirements including written notification of substantial completion, including contractor's prepared punch list of items to be completed;
- d. The Design Professional services include: the preparation of one (1) substantial completion/final completion observation report; and one (1) review of the HVAC Trade Contractor's resolution of the substantial completion/final completion observation report.
- e. The HVAC Trade Contractor agrees to compensate the Design Professional \$1,500.00 (per diem) for the preparation of additional substantial completion/final completion reports as required to achieve final completion.
- f. Any unpaid balance will be deducted from the contractor's final payment.

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# 3.24 FORMS

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Date of	Transm	uittal:	By Contractor: Contractor's Authorized : Print Name: Project:	Staff Signature:						
By ex	secuti	ng this Transmittal Cover	, the Contractor agr	ees and accept	s that:					
•	Subm Initial expen	ittals without the HVAC and E led approval stamps are not acc se.	Electrical Contractor's si ceptable. All resulting re	igned stamp of ap esubmittals will b	proval will not be reviewed. e provided at the Contractor's					
•	The Engineer's recommendation of acceptance ("Furnish as Submitted", "Furnish as Noted Below", etc.) of the equipment proposed by the Contractor is conditional upon the Contractor fulfilling all obligations of the Contract Documents. By furnishing the proposed equipment, the Contractor acknowledges compliance with all of the following:									
	0	The Contractor has completed fi related shop drawings, related tr	ield layout and planning of ades involved in Project C	proposed equipment onstruction, and all	nt and has coordinated all other space requirements.					
	0	The Contractor has examined all shop drawings prior to submission. The Contractor forwards all shop drawings with a signed approved stamp, signifying the following:								
		<ol> <li>All field measurements, data have been verified.</li> </ol>	field construction criteria,	materials, dimensio	ons, catalog numbers and similar					
		<ol> <li>The Architect/Engineer i require design resolution</li> <li>All items having an another income and an another income and an an</li></ol>	has been notified of all site n beyond resolution by Tra	e conditions which a de contractors' Fiel	affect the work, and which d Decisions;					
		<ol> <li>All items herein are applicable submittals, ar</li> </ol>	roved by the Contractor, a nd contract requirements;	nd have been coord	inated and checked with other					
		<ol> <li>Submission is clearly ma provided with the propo</li> </ol>	arked to indicate which ma sed equipment.	mufacturer's option	s are provided and which are not					
	0	Any and all exceptions requeste All exceptions, deletions, and ad annotated and initialed. Failing Contractor accepts the condition disputes.	d by the HVAC and Electr lditions that vary from the to provide the initialed am a that the Contract Docume	ical Contractors hav Contract Document notations for all dele ents will govern, and	ve been included in written form. ts have been specifically etions and additions, the d will be used to resolve					
	0	All Engineer's notes regarding t	his submission must be inc	corporated into the l	Project.					
	0	The Engineer's review is limited equipment to the specified techn	l to comparison of the tech uical performance.	nical performance o	of the Contractor's proposed					
	0	Equipment submittal is either th	e Basis-of-Design, or a co	mparable product to	the Basis-of-Design.					
	0	A Comparable Product must me but not limited to: material of m design; and performance require Project Design.	et or exceed all the salient anufacture; independent te ed to meet the Owner's nee	characteristics and sting agency certifi ds and meet the obj	standards necessary including, cations; quality; function; ectives of the Professional's					
	0	Extension of Contract Time and failure to provide submittals on a multiple resubmittals, and/or fai Refer to EQUIPMENT VARIAT of the Specifications.	/or claim for delay are not a timely basis to permit th lure to provide submittals ITONS AND SUBSTITUT	acceptable as create e processing work o that are comparable ITONS article in the	ed by the Trade Contractor's f the Professional, including to the Basis of Design Product. General Requirements Section					

G&H Project No: \_\_\_\_\_

G&H Shop Drawing Review No: H-

Contr	actor'	s Submittal Description:	, Project								
		HVAC AND ELEC	TRICAL TRADES'								
		COORDINATION OF	HVAC EQUIPMENT								
		ELECTRICAL R	EQUIREMENTS								
TRANSMITTAL COVER SHEET											
TO: GILLAN & HARTMANN, INC.											
P.O. BOX 345 VALLEY FORGE, PENNSYLVANIA 19481											
		•									
By HVAC Trade Rep: By Electrical Trade Rep:											
Print 1	Name:	Autorized Stari Signature.	Print Name:								
Date o	Date of Transmittal:										
By e	xecuti	ing this Transmittal Cover, the Contra	actor agrees and accepts that:								
1.	<ol> <li>Submittals without the HVAC and Electrical Trades' signed stamp of approval will not be reviewed. Initialed approval stamps are not acceptable. All resulting resubmittals will be provided at the Contractor's expense.</li> </ol>										
2.	2. The HVAC Trade Representative has submitted the attached HVAC Equipment Submittal to the Electrical Trade Representative for examination, review, and coordination of the attached HVAC Equipment Electrical Requirements. The equipment proposed by the Contractor is conditional upon the Contractor fulfilling all obligations of the Contract Documents. By furnishing the proposed equipment, the Contractor acknowledges compliance with all of the following:										
	A.	The Contractor has completed field lay coordinated all other related submittals and all space requirements.	out and planning of proposed equipment and has s, related Trades involved in Project Construction,								
	B. The HVAC and Electrical Trades have examined all submittals prior to submission. The HVAC and Electrical Trades forwards all submittals with a signed transmittal stamp, signifying the following:										
		<ol> <li>All field measurements, field const similar data have been verified;</li> </ol>	ruction criteria, electrical power requirements and								
	<ol> <li>The Architect/Engineer has been notified of all site conditions which affect the work, and which require design resolution beyond resolution by Trade contractors? Field Desisions:</li> </ol>										
		<ol> <li>All items herein are approved by th with other applicable submittals, an</li> </ol>	e Contractor, and have been coordinated and checked ad contract requirements;								
		<ol> <li>Submission is clearly marked to ind which are not provided with the pro-</li> </ol>	dicate which manufacturer's options are provided and oposed equipment.								
	C.	Any and all exceptions requested by th in written form. All exceptions, deleti Documents have been specifically ann annotations for all deletions and additi Contract Documents will govern, and y	the HVAC and Electrical Trades have been included ons, and additions that vary from the Contract otated and initialed. Failing to provide the initialed ons, the Contractor accepts the condition that the will be used to resolve disputes.								
G&H	Proje	ct No:									

G&H Shop Drawing Review No: \_\_\_\_\_

END OF SECTION 230010

# SECTION 230519 - METERS AND GAGES FOR HVAC PIPING

## 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 meters and gauges for HVAC systems.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include scale range, ratings, and calibrated performance curves for each meter, gage, fitting, specialty, and accessory specified.
- B. Shop Drawings: Include schedule indicating manufacturer's number, scale range, fittings, and location for each meter and gage.

## 1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gage from manufacturer, certifying accuracies under specified operating conditions and compliance with specified requirements.

#### 1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals. Include: manufacturer's written instructions; product data; factory and field test results; final adjustments; operational procedures; spare parts list; warranties.

#### PART 2 - PRODUCTS

# 2.1 TEST PLUGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Weiss Instruments, Inc; or a comparable product by one of the following:

- 1. Flow Design, Inc.
- 2. Trerice, H. O. Co.
- 3. Watts; a Watts Water Technologies company.
- 4. Or approved equal.
- B. Description: Test-station fitting made for insertion in piping tee fitting.
- C. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.
- D. Thread Size: NPS 1/2, ASME B1.20.1 pipe thread.
- E. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.
- F. Core Inserts: EPDM self-sealing rubber.

# 2.2 TEST-PLUG KITS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Weiss Instruments, Inc; or a comparable product by one of the following:
  - 1. Flow Design, Inc.
  - 2. Trerice, H. O. Co.
  - 3. Watts; a Watts Water Technologies company.
  - 4. Or approved equal.
- B. Furnish one test-plug kit(s) containing two thermometer(s), one pressure gage and adapter, and carrying case. Thermometer sensing elements, pressure gage, and adapter probes shall be of diameter to fit test plugs and of length to project into piping.
- C. Low-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch-diameter dial and tapered-end sensing element. Dial range shall be at least 25 to 125 deg F.
- D. High-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch-diameter dial and tapered-end sensing element. Dial range shall be at least 0 to 300 deg F.
- E. Pressure Gage: Small, Bourdon-tube insertion type with 2- to 3-inch-diameter dial and probe. Dial range shall be at least 0 to 200 psig.
- F. Carrying Case: Metal or plastic, with formed instrument padding.

# PART 3 - EXECUTION

#### 3.1 CONNECTIONS

A. Install test plugs in accordance with the manufacturer's recommendations.

# SECTION 230523 - BALL VALVES FOR HVAC PIPING

## 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. Bronze ball valves.

# 1.3 DEFINITIONS

A. CWP: Cold working pressure.

#### 1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
  - 1. Protect internal parts against rust and corrosion.
  - 2. Protect threads, flange faces, and weld ends.
  - 3. Set ball valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
  - 1. Maintain valve end protection.
  - 2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

## PART 2 - PRODUCTS

#### 2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
  - 1. ASME B1.20.1 for threads for threaded-end valves.
  - 2. ASME B16.18 for solder-joint connections.
  - 3. ASME B31.1 for power piping valves.
  - 4. ASME B31.9 for building services piping valves.
- C. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.
- D. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- E. Valve Sizes: Same as upstream piping unless otherwise indicated.
- F. Valve Actuator Types:
  - 1. Handlever: For quarter-turn valves smaller than NPS 4.
- G. Valves in Insulated Piping:
  - 1. Include 2-inch stem extensions.
  - 2. Extended operating handle of nonthermal-conductive material, and protective sleeves that allow operation of valves without breaking the vapor seals or disturbing insulation.

#### 2.2 BRONZE BALL VALVES

- A. Bronze Ball Valves, Two-Piece with Full Port and Bronze or Brass Trim:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO INC.; or a comparable product by one of the following:
    - a. Crane; Crane Energy Flow Solutions.
    - b. Hammond Valve.
    - c. Red-White Valve Corporation.
    - d. Watts; a Watts Water Technologies company.
    - e. Or approved equal.
  - 2. Description:
    - a. Standard: MSS SP-110.

- b. CWP Rating: 600 psig.
- c. Body Design: Two piece.
- d. Body Material: Bronze.
- e. Ends: Threaded.
- f. Seats: PTFE.
- g. Stem: Bronze.
- h. Ball: Chrome-plated brass.
- i. Port: Full.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. 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.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

## 3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install valve tags. Comply with requirements in other Division 23 Sections for valve tags and schedules.

#### 3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

- B. Select valves with the following end connections:
  - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint or pressure seal valve-end option is indicated in valve schedules below.

END OF SECTION 230523

# SECTION 230593 - TESTING, ADJUSTING, AND BALANCING

## 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. Balancing Air Systems:
    - a. Constant-volume air systems.
  - 2. Balancing Hydronic Piping Systems:
    - a. Constant-flow hydronic systems.
  - 3. Testing, Adjusting, and Balancing Equipment:
    - a. Motors.
    - b. Condensing units.
    - c. Heat-transfer coils.
  - 4. Control system verification.
- B. Replace fan and motor pulleys as required to achieve design conditions at no cost to the project.
- C. Provide diagrams for all air and hydronic systems indicating device balanced values. Diagrams must be with associated HVAC system.
  - 1. Show diagrammatic components of the HVAC equipment to indicate balanced values.
- D. Refer to all HVAC technical specification sections for additional TAB requirements including Division 23 Controls System Equipment, and all necessary field support for HVAC Commissioning.

#### 1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

- B. BAS: Building automation systems.
- C. NEBB: National Environmental Balancing Bureau.
- D. TAB: Testing, adjusting, and balancing.
- E. TABB: Testing, Adjusting, and Balancing Bureau.
- F. TAB Specialist: An independent entity meeting qualification to perform TAB work.
- G. TDH: Total dynamic head.

# 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. System Readiness Checklists: Within 30 days of Contractor's Notice to Proceed, submit system readiness checklists as specified in "Preparation" Article.
- E. Examination Report: Submit a summary report of the examination review required in "Examination" Article.
- F. Certified TAB reports.
- G. Sample report forms.
- H. Instrument calibration reports, to include the following:
  - 1. Instrument type and make.
  - 2. Serial number.
  - 3. Application.
  - 4. Dates of use.
  - 5. Dates of calibration.

# 1.5 QUALITY ASSURANCE

- A. TAB Specialists Qualifications: Certified by AABC.
  - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC.

- 2. TAB Technician: Employee of the TAB specialist and certified by AABC as a TAB technician.
- B. TAB Specialists Qualifications: Certified by NEBB or TABB.
  - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by NEBB or TABB.
  - 2. TAB Technician: Employee of the TAB specialist and certified by NEBB or TABB as a TAB technician.
- C. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
- D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 "System Balancing."

## 1.6 FIELD CONDITIONS

A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

## 1.7 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.
- B. Notice: Provide 7 days' advance notice for each test. Include scheduled test dates and times.
- C. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

# 1.8 WARRANTY

- A. General Warranty: The national project performance guarantee specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. National Project Performance Guarantee: Provide a guarantee on AABC'S "National Standards" forms stating that AABC will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:
  - 1. The certified Agent has tested and balanced systems according to the Contract Documents.

- 2. Systems are balanced to optimum performance capabilities within design and installation limits.
- C. Special Guarantee: Provide a guarantee on NEBB forms stating that NEBB will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:
  - 1. The certified Agent has tested and balanced systems according to the Contract Documents.
  - 2. Systems are balanced to optimum performance capabilities within design and installation limits.
- D. Special Guarantee: Provide a guarantee on TABB's "International Quality Assurance Program" forms stating that TABB will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:
  - 1. The certified Agent has tested and balanced systems according to the Contract Documents.
  - 2. Systems are balanced to optimum performance capabilities within design and installation limits.

## PART 2 - PRODUCTS (Not Applicable)

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
- B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan and pump curves.

- 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.
- 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems Duct Design." Compare results with the design data and installed conditions.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC equipment and verify that filters are clean, and equipment with functioning controls is ready for operation.
- I. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.
- J. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.
- K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- L. Examine existing system pumps to ensure absence of entrained air in the suction piping.
- M. Examine operating safety interlocks and controls on HVAC equipment.
- N. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

#### 3.2 PREPARATION

- A. Prepare a TAB plan that includes the following:
  - 1. Equipment and systems to be tested.
  - 2. Strategies and step-by-step procedures for balancing the systems.
  - 3. Instrumentation to be used.
  - 4. Sample forms with specific identification for all equipment.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
  - 1. Airside:

- a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
- b. Duct systems are complete with terminals installed.
- c. Volume, smoke, and fire dampers are open and functional.
- d. Clean filters are installed.
- e. Fans are operating, free of vibration, and rotating in correct direction.
- f. Automatic temperature-control systems are operational.
- g. Ceilings are installed.
- h. Suitable access to balancing devices and equipment is provided.
- 2. Hydronics:
  - a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed.
  - b. Piping is complete with terminals installed.
  - c. Water treatment is complete.
  - d. Systems are flushed, filled, and air purged.
  - e. Strainers are pulled and cleaned.
  - f. Control valves are functioning per the sequence of operation.
  - g. Shutoff and balance valves have been verified to be 100 percent open.
  - h. Suitable access to balancing devices and equipment is provided.

## 3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", SMACNA's "HVAC Systems Testing, Adjusting, and Balancing", and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
  - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
  - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in applicable Division 23 Sections.
  - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to applicable Division 23 Sections.
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

## 3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaustair dampers through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling-unit components.
- K. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

#### 3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
  - 1. Measure total airflow.
    - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
    - b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
    - c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
    - d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
  - 2. Measure fan static pressures as follows:
    - a. Measure static pressure directly at the fan outlet or through the flexible connection.

- b. Measure static pressure directly at the fan inlet or through the flexible connection.
- c. Measure static pressure across each component that makes up the air-handling system.
- d. Report artificial loading of filters at the time static pressures are measured.
- 3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
- 4. Obtain approval from Professional for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
- 5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.
  - 1. Measure airflow of submain and branch ducts.
  - 2. Adjust submain and branch duct volume dampers for specified airflow.
  - 3. Re-measure each submain and branch duct after all have been adjusted.
- C. Adjust air inlets and outlets for each space to indicated airflows.
  - 1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
  - 2. Measure inlets and outlets airflow.
  - 3. Adjust each inlet and outlet for specified airflow.
  - 4. Re-measure each inlet and outlet after they have been adjusted.
- D. Verify final system conditions.
  - 1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
  - 2. Re-measure and confirm that total airflow is within design.
  - 3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
  - 4. Mark all final settings.
  - 5. Test system in economizer mode. Verify proper operation and adjust if necessary.
  - 6. Measure and record all operating data.
  - 7. Record final fan-performance data.

#### **3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS**

A. Prepare test reports for coils. Obtain approved submittals and manufacturer-recommended testing procedures.

- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. In addition to requirements in "Preparation" Article, prepare hydronic systems for testing and balancing as follows:
  - 1. Check liquid level in expansion tank.
  - 2. Check highest vent for adequate pressure.
  - 3. Check flow-control valves for proper position.
  - 4. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
  - 5. Verify that motor starters are equipped with properly sized thermal protection.
  - 6. Check that air has been purged from the system.

# 3.7 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

- A. Adjust flow-measuring devices installed in mains and branches to design water flows.
  - 1. Measure flow in main and branch pipes.
  - 2. Adjust main and branch balance valves for design flow.
  - 3. Re-measure each main and branch after all have been adjusted.
- B. Adjust flow-measuring devices installed at terminals for each space to design water flows.
  - 1. Measure flow at terminals.
  - 2. Adjust each terminal to design flow.
  - 3. Re-measure each terminal after it is adjusted.
  - 4. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
  - 5. Perform temperature tests after flows have been balanced.
- C. For systems without pressure-independent valves or flow-measuring devices at terminals:
  - 1. Measure and balance coils by either coil pressure drop or temperature method.
  - 2. If balanced by coil pressure drop, perform temperature tests after flows have been verified.
- D. Verify final system conditions as follows:
  - 1. Re-measure and confirm that total water flow is within design.
  - 2. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
  - 3. Mark final settings.
- E. Verify that memory stops have been set.

## 3.8 **PROCEDURES FOR MOTORS**

- A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:
  - 1. Manufacturer's name, model number, and serial number.

- 2. Motor horsepower rating.
- 3. Motor rpm.
- 4. Phase and hertz.
- 5. Nameplate and measured voltage, each phase.
- 6. Nameplate and measured amperage, each phase.
- 7. Starter size and thermal-protection-element rating.
- 8. Service factor and frame size.
- B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

## 3.9 **PROCEDURES FOR HEAT-TRANSFER COILS**

- A. Measure, adjust, and record the following data for each water coil:
  - 1. Entering- and leaving-water temperature.
  - 2. Water flow rate.
  - 3. Water pressure drop for major (more than 20 gpm) equipment coils, excluding unitary equipment such as reheat coils, unit heaters, and fan-coil units.
  - 4. Dry-bulb temperature of entering and leaving air.
  - 5. Wet-bulb temperature of entering and leaving air for cooling coils.
  - 6. Airflow.
- B. Measure, adjust, and record the following data for each electric heating coil:
  - 1. Nameplate data.
  - 2. Airflow.
  - 3. Entering- and leaving-air temperature at full load.
  - 4. Voltage and amperage input of each phase at full load.
  - 5. Calculated kilowatt at full load.
  - 6. Fuse or circuit-breaker rating for overload protection.
- C. Measure, adjust, and record the following data for each refrigerant coil:
  - 1. Dry-bulb temperature of entering and leaving air.
  - 2. Wet-bulb temperature of entering and leaving air.
  - 3. Airflow.

#### 3.10 SOUND TESTS

- A. After the systems are balanced and construction is Substantially Complete perform sound testing at locations on Project for each of the following space types. For each space type tested, select a measurement location that has the greatest sound level. If testing multiple locations for each space type, select at least one location that is near and at least one location that is remote from the predominant sound source.
  - 1. Classrooms

- B. Instrumentation:
  - 1. The sound-testing meter shall be a portable, general-purpose testing meter consisting of a microphone, processing unit, and readout.
  - 2. The sound-testing meter shall be capable of showing fluctuations at minimum and maximum levels, and measuring the equivalent continuous sound pressure level (LEQ).
  - 3. The sound-testing meter must be capable of using 1/3 octave band filters to measure mid-frequencies from 31.5 Hz to 8000 Hz.
  - 4. The accuracy of the sound-testing meter shall be plus or minus one decibel.
- C. Test Procedures:
  - 1. Perform test at quietest background noise period. Note cause of unpreventable sound that affects test outcome.
  - 2. Equipment should be operating at design values.
  - 3. Calibrate the sound-testing meter prior to taking measurements.
  - 4. Use a microphone suitable for the type of noise levels measured that is compatible with meter. Provide a windshield for outside or in-duct measurements.
  - 5. Record a set of background measurements in dBA and sound pressure levels in the eight un-weighted octave bands 63 Hz to 8000 Hz (NC) with the equipment off.
  - 6. Take sound readings in dBA and sound pressure levels in the eight un-weighted octave bands 63 Hz to 8000 Hz (NC) with the equipment operating.
  - 7. Take readings no closer than 36 inches from a wall or from the operating equipment and approximately 60 inches from the floor, with the meter held or mounted on a tripod.
  - 8. For outdoor measurements, move sound-testing meter slowly and scan area that has the most exposure to noise source being tested. Use A-weighted scale for this type of reading.
- D. Reporting:
  - 1. Report shall record the following:
    - a. Location.
    - b. System tested.
    - c. dBA reading.
    - d. Sound pressure level in each octave band with equipment on and off.
  - 2. Plot sound pressure levels on NC worksheet with equipment on and off.

# 3.11 CONTROLS VERIFICATION

- A. In conjunction with system balancing, perform the following:
  - 1. Verify temperature control system is operating within the design limitations.
  - 2. Confirm that the sequences of operation are in compliance with Contract Documents.
  - 3. Verify that controllers are calibrated and function as intended.
  - 4. Verify that controller set points are as indicated.
  - 5. Verify the operation of lockout or interlock systems.

- 6. Verify the operation of valve and damper actuators.
- 7. Verify that controlled devices are properly installed and connected to correct controller.
- 8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
- 9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.
- B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

# 3.12 TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
  - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 0 to plus 10 percent.
  - 2. Air Outlets and Inlets: Plus 0 to plus 10 percent.
  - 3. Heating-Water Flow Rate: Plus or minus 10 percent.
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

## 3.13 PROGRESS REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems balancing devices. Recommend changes and additions to systems balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare monthly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

# 3.14 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
  - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
  - 2. Include a list of instruments used for procedures, along with proof of calibration.
  - 3. Certify validity and accuracy of field data.
- B. Final Report Contents: In addition to certified field-report data, include the following:

- 1. Fan curves.
- 2. Manufacturers' test data.
- 3. Field test reports prepared by system and equipment installers.
- 4. Other information relative to equipment performance; do not include Shop Drawings and Product Data.
- C. General Report Data: In addition to form titles and entries, include the following data:
  - 1. Title page.
  - 2. Name and address of the TAB specialist.
  - 3. Project name.
  - 4. Project location.
  - 5. Architect's name and address.
  - 6. Engineer's name and address.
  - 7. Contractor's name and address.
  - 8. Report date.
  - 9. Signature of TAB supervisor who certifies the report.
  - 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
  - 11. Summary of contents including the following:
    - a. Indicated versus final performance.
    - b. Notable characteristics of systems.
    - c. Description of system operation sequence if it varies from the Contract Documents.
  - 12. Nomenclature sheets for each item of equipment.
  - 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
  - 14. Notes to explain why certain final data in the body of reports vary from indicated values.
  - 15. Test conditions for fans and pump performance forms including the following:
    - a. Settings for outdoor-, return-, and exhaust-air dampers.
    - b. Conditions of filters.
    - c. Cooling coil, wet- and dry-bulb conditions.
    - d. Face and bypass damper settings at coils.
    - e. Fan drive settings including settings and percentage of maximum pitch diameter.
    - f. Inlet vane settings for variable-air-volume systems.
    - g. Settings for supply-air, static-pressure controller.
    - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
  - 1. Quantities of outdoor, supply, return, and exhaust airflows.
  - 2. Water and steam flow rates.
  - 3. Duct, outlet, and inlet sizes.
  - 4. Pipe and valve sizes and locations.
  - 5. Terminal units.
  - 6. Balancing stations.

- 7. Position of balancing devices.
- E. Air-Handling-Unit Test Reports (UV's and RTU's): For air-handling units with coils, include the following:
  - 1. Unit Data:
    - a. Unit identification.
    - b. Location.
    - c. Make and type.
    - d. Model number and unit size.
    - e. Manufacturer's serial number.
    - f. Unit arrangement and class.
    - g. Discharge arrangement.
    - h. Sheave make, size in inches, and bore.
    - i. Center-to-center dimensions of sheave and amount of adjustments in inches.
    - j. Number, make, and size of belts.
    - k. Number, type, and size of filters.
  - 2. Motor Data:
    - a. Motor make, and frame type and size.
    - b. Horsepower and rpm.
    - c. Volts, phase, and hertz.
    - d. Full-load amperage and service factor.
    - e. Sheave make, size in inches, and bore.
    - f. Center-to-center dimensions of sheave and amount of adjustments in inches.
  - 3. Test Data (Indicated and Actual Values):
    - a. Total airflow rate in cfm.
    - b. Total system static pressure in inches wg.
    - c. Fan rpm.
    - d. Discharge static pressure in inches wg.
    - e. Filter static-pressure differential in inches wg.
    - f. Preheat-coil static-pressure differential in inches wg.
    - g. Cooling-coil static-pressure differential in inches wg.
    - h. Heating-coil static-pressure differential in inches wg.
    - i. Outdoor airflow in cfm.
    - j. Return airflow in cfm.
    - k. Outdoor-air damper position.
    - I. Return-air damper position.
    - m. Vortex damper position.
- F. Apparatus-Coil Test Reports:
  - 1. Coil Data:
    - a. System identification.

- b. Location.
- c. Coil type.
- d. Number of rows.
- e. Fin spacing in fins per inch o.c.
- f. Make and model number.
- g. Face area in sq. ft.
- h. Tube size in NPS.
- i. Tube and fin materials.
- j. Circuiting arrangement.
- 2. Test Data (Indicated and Actual Values):
  - a. Airflow rate in cfm.
  - b. Average face velocity in fpm.
  - c. Air pressure drop in inches wg.
  - d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
  - e. Return-air, wet- and dry-bulb temperatures in deg F.
  - f. Entering-air, wet- and dry-bulb temperatures in deg F.
  - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
  - h. Water flow rate in gpm.
  - i. Water pressure differential in feet of head or psig.
  - j. Entering-water temperature in deg F.
  - k. Leaving-water temperature in deg F.
  - I. Refrigerant expansion valve and refrigerant types.
  - m. Refrigerant suction pressure in psig.
  - n. Refrigerant suction temperature in deg F.
- G. Instrument Calibration Reports:
  - 1. Report Data:
    - a. Instrument type and make.
    - b. Serial number.
    - c. Application.
    - d. Dates of use.
    - e. Dates of calibration.

# 3.15 VERIFICATION OF TAB REPORT

- A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Owner.
- B. Owner shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

- C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- E. If TAB work fails, proceed as follows:
  - 1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
  - 2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
  - 3. If the second verification also fails, design professional may contact AABC Headquarters regarding the AABC National Performance Guaranty.
- F. Prepare test and inspection reports.

# 3.16 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

# SECTION 230713 - DUCT INSULATION

## 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 insulation for duct systems.

## 1.3 DEFINITIONS

- A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.
- B. Dual-Temperature Surfaces: Normal operating temperatures that vary from hot to cold.
- C. Cold Surfaces: Normal operating temperature less than 75 deg F.
- D. Thermal Conductivity (k-value): Measure of heat flow through a material at a given temperature difference; conductivity is expressed in units of Btu x inch/h x sq. ft. x deg F.
- E. Density: Is expressed in lb/cu. ft.

## 1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

# 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
  - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

# 1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

# 1.8 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in other Division 23 Sections.
- B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

# PART 2 - PRODUCTS

#### 2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. CertainTeed Corporation.
  - b. Johns Manville; a Berkshire Hathaway company.
  - c. Knauf Insulation.
  - d. Manson Insulation Inc.
  - e. Owens Corning.
  - f. Or approved equal.
- 2. Performance Characteristics:
  - a. Thermal Conductivity: 0.29 Btu x inch/h x sq. ft. x deg F average maximum, at 75 deg F mean temperature.

## 2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
  - 1. Produced under the UL Classification and Follow-up service.
  - 2. Type: Non-flammable, solvent-based.
  - 3. Service Temperature Range: Minus 20 to 180 deg F.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

### 2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
  - 1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
  - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
  - 3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.

## 2.4 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

- 1. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fireresistant lagging cloths over duct insulation.
- 2. Service Temperature Range: 0 to plus 180 deg F.
- 3. Color: White.

## 2.5 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
  - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
  - 2. Fire- and water-resistant, flexible, elastomeric sealant.
  - 3. Service Temperature Range: Minus 40 to plus 250 deg F.
  - 4. Color: Aluminum.

#### 2.6 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
  - 1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
  - 2. Performance Characteristics:
    - a. Water Vapor Permeance: 0.02 perm maximum, when tested according to ASTM E 96.
    - b. Puncture Resistance: 50 beach units minimum, when tested according to ASTM D 781.

### 2.7 TAPES

- A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Avery Dennison Corporation, Specialty Tapes Division.
    - b. Knauf Insulation.
    - c. Venture Tape.
    - d. Or approved equal.
  - 2. Width: 3 inches.
  - 3. Thickness: 6.5 mils.
  - 4. Adhesion: 90 ounces force/inch in width.
  - 5. Elongation: 2 percent.
  - 6. Tensile Strength: 40 lbf/inch in width.

- 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Avery Dennison Corporation, Specialty Tapes Division.
    - b. Knauf Insulation.
    - c. Venture Tape.
    - d. Or approved equal.
  - 2. Width: 2 inches.
  - 3. Thickness: 3.7 mils.
  - 4. Adhesion: 100 ounces force/inch in width.
  - 5. Elongation: 5 percent.
  - 6. Tensile Strength: 34 lbf/inch in width.

#### 2.8 SECUREMENTS

- A. Bands:
  - 1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 3/4 inch wide with wing seal or closed seal.
- B. Insulation Pins and Hangers:
  - 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- D. Wire: 0.062-inch soft-annealed, stainless steel.

# 2.9 CORNER ANGLES

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
  - 1. Verify that systems to be insulated have been tested and are free of defects.
  - 2. Verify that surfaces to be insulated are clean and dry.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

## 3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.

- 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
- 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
  - a. For below ambient services, apply vapor-barrier mastic over staples.
- 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
- 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- O. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
  - 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for a minimum of 50 percent coverage of duct and plenum surfaces.
  - 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
  - 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    - d. Do not overcompress insulation during installation.
    - e. Impale insulation over pins and attach speed washers.
    - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
  - 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with

insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

- a. Repair punctures, tears, and penetrations with tape or mastic to maintain vaporbarrier seal.
- b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
- 5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
- 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
- 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

# 3.4 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in other Division 09 Sections.
  - 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
    - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- C. Do not field paint aluminum or stainless-steel jackets.

## 3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
  - 1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to two location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

### 3.6 DUCT INSULATION SCHEDULE, GENERAL

- A. Items Not Insulated:
  - 1. Fibrous-glass ducts.
  - 2. Metal ducts with duct liner of sufficient thickness to comply with energy code.
  - 3. Factory-insulated flexible ducts, plenums, and casings.
  - 4. Factory-insulated plenums and casings.
  - 5. Flexible connectors.
  - 6. Vibration-control devices.
  - 7. Factory-insulated access panels and doors.

INTERIOR CONCEALED HVAC SUPPLY DUCTS, RETURN DUCTS, OUTSIDE AIR DUCTS AND								
PLENUMS								
MATERIAL	FORM	THICKNESS IN VAPOR BARRIER		FIELD APPLIED				
		INCHES	REQ'D	JACKET				
GLASS FIBER	BLANKET	2	YES	NONE				
INTERIOR EXPOSED HVAC SUPPLY DUCTS, RETURN DUCTS, OUTSIDE AIR DUCTS AND PLENUMS								
MATERIAL	FORM	THICKNESS IN	VAPOR BARRIER	FIELD APPLIED				
		INCHES	REQ'D	JACKET				
GLASS FIBER	BOARD	1-1/2	YES	NONE				

END OF SECTION 230713

## **SECTION 230719 - HVAC PIPING INSULATION**

### 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 insulating the following HVAC piping systems:
  - 1. Cooling Coil Condensate drain piping.
  - 2. Heating hot-water piping.

#### 1.3 DEFINITIONS

- A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.
- B. Cold Surfaces: Normal operating temperatures less than 75 deg F.
- C. Thermal Conductivity (k-value): Measure of heat flow through a material at a given temperature difference; conductivity is expressed in units of Btu x inch/h x sq. ft. x deg F.
- D. Density: Is expressed in pcf.

#### 1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

#### 1.6 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
  - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

### 1.8 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in other Division 23 Sections.
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

#### 1.9 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

#### PART 2 - PRODUCTS

#### 2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General," articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Armacell LLC ; AP Armaflex. or a comparable product by one of the following:
    - a. Aeroflex USA, Inc.
    - b. K-Flex USA.
    - c. Or approved equal.
- F. Mineral-Fiber, Preformed Pipe Insulation:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Johns Manville; a Berkshire Hathaway company.
    - b. Knauf Insulation.
    - c. Manson Insulation Inc.
    - d. Owens Corning.
    - e. Or approved equal.
  - 2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

## 2.2 INSULATING CEMENTS

- A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.
  - 1. Thermal Conductivity: 1.0 Btu x inch/h x sq. ft. x deg F average maximum at 500 deg F mean temperature.
  - 2. Compressive Strength: 10 psi at 5 percent deformation.
- B. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.
  - 1. Thermal Conductivity: 1.2 Btu x inch/h x sq. ft. x deg F average maximum at 500 deg F mean temperature.
  - 2. Compressive Strength: 100 psi at 5 percent deformation.

### 2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
  - 1. Solvent-based, contact adhesive recommended by insulation manufacturer.
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
  - 1. Produced under the UL Classification and Follow-up service.
  - 2. Type: Non-flammable, solvent-based.
  - 3. Service Temperature Range: Minus 20 to 180 deg F.
- D. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
  - 1. Class 1, Grade A for bonding glass cloth and tape to unfaced glass fiber insulation, sealing edges of glass fiber insulation, and bonding lagging cloth to unfaced glass fiber insulation.
  - 2. Class 2, Grade A for bonding glass fiber insulation to metal surfaces.
- E. PVC Jacket Adhesive: Compatible with PVC jacket.

#### 2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
  - 1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
  - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
  - 3. Solids Content: 60 percent by volume and 66 percent by weight.
  - 4. Color: White.

#### 2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
  - 1. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fireresistant lagging cloths over pipe insulation.
  - 2. Service Temperature Range: 0 to plus 180 deg F.
  - 3. Color: White.

### 2.6 SEALANTS

- A. Jacket Flashing Sealants:
  - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
  - 2. and water-resistant, flex Fire-ible, elastomeric sealant.
  - 3. Service Temperature Range: Minus 40 to plus 250 deg F.
  - 4. Color: White.

## 2.7 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
  - 1. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

### 2.8 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Fitting Covers: 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. Adhesive: As recommended by jacket material manufacturer.
  - 2. Color: White.
  - 3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
    - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

#### 2.9 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
  - 1. Width: 3 inches.
  - 2. Thickness: 11.5 mils.
  - 3. Adhesion: 90 ounces force/inch in width.
  - 4. Elongation: 2 percent.
  - 5. Tensile Strength: 40 lbf/inch in width.
  - 6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

- 1. Width: 2 inches.
- 2. Thickness: 6 mils.
- 3. Adhesion: 64 ounces force/inch in width.
- 4. Elongation: 500 percent.
- 5. Tensile Strength: 18 lbf/inch in width.

### 2.10 SECUREMENTS

- A. Bands:
  - 1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 3/4 inch wide with wing seal.
- B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- C. Wire: 0.062-inch soft-annealed, stainless steel.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
  - 1. Verify that systems to be insulated have been tested and are free of defects.
  - 2. Verify that surfaces to be insulated are clean and dry.
  - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

#### 3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
  - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
  - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
    - a. For below-ambient services, apply vapor-barrier mastic over staples.
  - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
  - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
  - 1. Vibration-control devices.
  - 2. Testing agency labels and stamps.
  - 3. Nameplates and data plates.
  - 4. Manholes.
  - 5. Handholes.
  - 6. Cleanouts.

#### 3.4 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
  - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
  - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
  - 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
  - 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
  - 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and

replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

- 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
- 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
- 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
- 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
  - 1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
  - 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
  - 3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
  - 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

# 3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:

- 1. Install pipe insulation to outer diameter of pipe flange.
- 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
- 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
- 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
  - 1. Install mitered sections of pipe insulation.
  - 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
  - 1. Install preformed valve covers manufactured of same material as pipe insulation when available.
  - 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
  - 3. Install insulation to flanges as specified for flange insulation application.
  - 4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

## 3.6 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
  - 1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
  - 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
  - 3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
  - 4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Flanges:
  - 1. Install preformed pipe insulation to outer diameter of pipe flange.
  - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

- 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
- 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- C. Insulation Installation on Pipe Fittings and Elbows:
  - 1. Install preformed sections of same material as straight segments of pipe insulation when available.
  - 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
- D. Insulation Installation on Valves and Pipe Specialties:
  - 1. Install preformed sections of same material as straight segments of pipe insulation when available.
  - 2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
  - 3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
  - 4. Install insulation to flanges as specified for flange insulation application.

## 3.7 FIELD-APPLIED JACKET INSTALLATION

1. Provide PVC covers and all fittings and valves.

## 3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
  - 1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
  - 2. Inspection quantities are a per school basis
- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

## 3.9 **PIPING INSULATION SCHEDULE, GENERAL**

- A. General: Abbreviations used in the following schedules include:
  - 1. Field-Applied Jackets as an alternate to those specified above: P PVC, K Foil and Paper, A Aluminum, SS Stainless Steel.
  - 2. Pipe Sizes: NPS Nominal Pipe Size (DN Nominal Dimension).
- B. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- C. Provide PVC fittings on all piping unless otherwise noted.

INTERIOR HEATING HOT WATER HYDRONIC (75 TO 200 DEG F) PIPING								
PIPE SIZES <u>(NPS)</u>		THICKNESS IN	VAPOR BARRIER	FIELD APPLIED				
	IVIATERIALS	INCHES	REQ'D	JACKET				
1/2 TO 1-1/4	MINERAL FIBER	1-1/2	NO	NONE				
1-1/2 AND		2	NO	NONE				
LARGER	WIINERAL FIBER	2	NO					
INTERIOR COOLING COIL CONDENSATE PIPING								
PIPE SIZES <u>(NPS)</u>		THICKNESS IN	VAPOR BARRIER	FIELD APPLIED				
	IVIATERIALS	INCHES	REQ'D	JACKET				
1/2 TO 1-1/4	MINERAL FIBER	1/2	YES	NONE				

END OF SECTION 230719

# SECTION 230923 - DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC

### PART 1 - SECTION 230923 - 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

- Α. Provide an extension to the existing BACnet Building Management System (BMS) incorporating Direct Digital Control (DDC), equipment monitoring, and control consisting of microcomputer based network controls, digital electronic controllers and unit specific controllers interfacing directly with sensors, actuators and environmental delivery systems (i.e., Air handling equipment, etc.); electric controls and mechanical devices for items indicated on drawings or described herein including dampers, panels; a primary communication network to allow data exchange; microcomputer based digital control modules interfacing with sensors, actuators, and terminal equipment control devices; and secondary communication networks interfacing network devices. All Network Control Units and Equipment Controllers shall be tied to the existing Building Management System DDC system front-end. The Building Management System Contractor (BMSC) shall provide all labor, materials and software required for the new devices, their implementation and expansion onto the CM3 Building Solutions Automation System which is currently serving the Egg Harbor Township School District's (EHTSD) Facilities. It is the intention of the EHTSD to standardize on the current District BMS presently installed at the Swift Elementary School and to have a single building automation system controlling the facility. The same system is planned for installation at the Slaybaugh Elementary School prior to the delivery of new rooftop equipment associated with the project. New controllers shall interface seamlessly with the School's existing Schneider Electric Ecostructure Building Operations System and accessed through the District's existing BAS workstations. The System Integration Contractor (SIC) shall integrate the expansion onto the existing infrastructure to create a seamless graphical user interface package. The district has standardized Tridium Niagara Server. The BMSC shall retain the services of the sites System Integration Contractor SIC as described within this specification. The school district's controls contractor (SIC) is CM3 Building Solutions, contact Peter Gregory at 215-360-7960.
- B. The work under this Section of the Specification shall include all labor, materials, equipment, software, licenses, and services necessary for and incidental to the proper completion of the new Building Management System (BMS) and related work shown, implied or specified, but is not limited to the following as described hereinafter.
- C. Extend the existing BMS for a complete turnkey, stand-alone, fully operational BACnet top to bottom Direct Digital Control (DDC) System. Provide additions and modifications to the existing pneumatic and electronic control systems as required for a fully operational system.

- D. Prior to commencing of work, label existing pneumatic control lines to ensure proper identification and removal. Existing pneumatic control system to remain for areas not in project scope.
- E. Discharge Air Temperature Sensors:
  - 1. Provide discharge air temperature sensors for all air-side HVAC equipment including but not limited to Unit Ventilators, and Rooftop Units. Include work and materials required for integrating discharge air temperature sensors into the existing building equipment. Obtaining and/or providing all materials, permissions and services as necessary to facilitate integration and accessing of point necessary for pulling discharge air temperature sensor points from existing Building equipment.
- F. General: The control system shall consist of a high-speed, peer-to-peer network of DDC controllers and a web-based system, and capable of connecting to a web server with a network interface.
- G. The system shall directly control HVAC equipment as specified hereinafter in the Sequence of Operation and Drawing Equipment Schedules. Each zone controller shall provide occupied and unoccupied modes of operation by individual zone. Furnish energy conversation features such as optimal start and stop, night setback, request-based logic, and demand level adjustment of setpoints.
- H. System shall use the BACnet protocol for communication to the main panel CPU for communication between control modules. Schedules, setpoints, trends, and alarms specified in Sequences of Operation shall be BACnet objects.
- I. All points of user interface shall be on standard PCs that do not require the purchase of any special software from the BMS manufacturer for use as a building operations terminal. The primary point of interface on these PCs will be a standard Web Browser such as Internet Explorer or Mozilla Firefox.
- J. Control system must comply with the standard of ASHRAE/ANSI 135-(latest edition) Data Communication Protocol for Building Automation and Control Systems (BACnet).
- K. Prior to the submission of the ATC system shop drawing, submit a letter or contract from specified manufacturer indicating authorization from contracting firm to procure, install, and service specified manufacturer's equipment. The ATC shop drawing will not be reviewed until such document is reviewed and approved by Engineer.
- L. Provide sufficient site visits to complete installation and provide startup and commission controls for each completed phase of the project, including change of seasons for re-commissioning during alternate mode of operation.
- M. Exposed ATC panel in finished spaces as shown on drawings shall be painted by the General Construction Prime Contractor. These panels shall include same key locks.

- N. The ATC system shall be powered from the building power. Provide wiring and devices as required to extend wires and conduits from the local panels where not indicated on the Electrical Drawings. Wiring shall meet the requirements of national, state and local codes.
- O. All setpoints shall be adjustable through the existing head end controller, or any PC connected to the internet via password protection.

## 1.3 WORK INCLUDED

- A. Extend the existing BACnet Building Management System (BMS) incorporating Direct Digital Control (DDC), equipment monitoring, and control consisting of microcomputer based network controls, digital electronic controllers and unit specific controllers interfacing directly with sensors, actuators and environmental delivery systems (i.e., VAV boxes, unit ventilators, fin tube radiation, air handling equipment, rooftop unit, pumps, etc.); electric controls and mechanical devices for items indicated on drawings or described herein including dampers, valves, panels; a primary communication network to allow data exchange; microcomputer based digital control modules interfacing with sensors, actuators, and terminal equipment control devices; and secondary communication networks interfacing network devices. All Network Control Units and Equipment Controllers shall be tied to the existing Building Management System DDC system front-end.
- B. Provide all submittals, data entry, and electrical installation where indicated, programming, start-up, test and validation acceptance documentation, and system warranty.
- C. The control system shall consist of all sensors, transmitters, controllers, control panels, software, programming service tools, interconnecting wiring, power wiring and any other devices or installation materials needed to fill the intent of the specification, the Sequence of Operation and to provide for a complete and operable system.
- D. All wiring, including interlock and power wiring, required for the operation of the control system shall be provided by the control specialist, except where specifically noted elsewhere. Wiring shall meet the requirements of National, State, and Local codes and the Electrical Sections of this specification.
- E. The engineering, installation, calibration, programming and commissioning necessary for a complete and fully operational control system, as specified, shall be provided by the Controls Specialist.
- F. Provide surge protection for wiring and all system components.
- G. Provide conduit for exposed BMS communication wiring.
- H. Label all ATC control wiring as "BMS Cabling" with self-adhering markers at 20' intervals on straight runs, at change of direction and at entrance and exit points through walls, floors and ceilings.
- I. All controllers and control points shall be programmed for trending capability and activated through the frontend.

- J. Coordinate with the Owner the required levels of alarms, assignments of defined levels and dial out sequences. Remove all nuisance alarms that have been pre-programmed into the software, review with the Owner.
- K. Points List, Sequence of Operations and Specification Parts 1, 2 and 3 of this section and sequence indicated in Division 23 sections makeup the entire DDC system requirements including, but not limited to control devices, controller types, O/I's and accessories required to facilitate system sequences and complex operations, and shall be incorporated as a comprehensive Digital/Analog/I/O control solution. Work shall not be limited to only the scheduled I/O list.
- L. All setpoints shall be adjustable through the front-end software.
- M. Provide all programming to interface new work with operation of existing system. Programming of the controls and system sequences shall be performed utilizing the front-end software.
  - 1. Submit example of graphics for Owner approval.
  - 2. Submit at the completion of work, a copy of the untranslated (not compiled) database for future modifications. Database shall be submitted on a USB drive.
- N. Conceal all control wiring in occupied spaces within walls.
- O. All cabling to be plenum rated and supported in accordance with the project electrical specifications, local codes and NEC.

## 1.4 DEFINITIONS

- A. Algorithm: A logical procedure for solving a recurrent mathematical problem. A prescribed set of well-defined rules or processes for solving a problem in a finite number of steps.
- B. Analog: A continuously varying signal value, such as current, flow, pressure, or temperature.
- C. BACnet Specific Definitions:
  - 1. BACnet: Building Automation Control Network Protocol, ASHRAE 135. A communications protocol allowing devices to communicate data over and services over a network.
  - 2. BACnet Interoperability Building Blocks (BIBBs): BIBB defines a small portion of BACnet functionality that is needed to perform a particular task. BIBBs are combined to build the BACnet functional requirements for a device.
  - 3. BACnet/IP: Defines and allows using a reserved UDP socket to transmit BACnet messages over IP networks. A BACnet/IP network is a collection of one or more IP subnetworks that share the same BACnet network number.
  - 4. BACnet Testing Laboratories (BTL): Organization responsible for testing products for compliance with ASHRAE 135, operated under direction of BACnet International.
  - 5. PICS (Protocol Implementation Conformance Statement): Written document that identifies the particular options specified by BACnet that are implemented in a device.

- D. Binary: Two-state signal where a high signal level represents ON" or "OPEN" condition and a low signal level represents "OFF" or "CLOSED" condition. "Digital" is sometimes used interchangeably with "Binary" to indicate a two-state signal.
- E. Controller: Generic term for any standalone, microprocessor-based, digital controller residing on a network, used for local or global control. Three types of controllers are indicated: Network Controller, Programmable Application Controller, and Application-Specific Controller.
- F. Control System Integrator: An entity that assists in expansion of existing enterprise system and support of additional operator interfaces to I/O being added to existing enterprise system.
- G. E/P: Voltage to pneumatic.
- H. Gateway: Bidirectional protocol translator that connects control systems that use different communication protocols.
- I. I/O: System through which information is received and transmitted. I/O refers to analog input (AI), binary input (BI), analog output (AO) and binary output (BO). Analog signals are continuous and represent control influences such as flow, level, moisture, pressure, and temperature. Binary signals convert electronic signals to digital pulses (values) and generally represent two-position operating and alarm status. "Digital," (DI) and (DO), is sometimes used interchangeably with "Binary," (BI) and (BO), respectively.
- J. LAN: Local area network.
- K. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.
- L. Modbus TCP/IP: An open protocol for exchange of process data.
- M. MS/TP: Master-slave/token-passing, IEE 8802-3. Datalink protocol LAN option that uses twisted-pair wire for low-speed communication.
- N. MTBF: Mean time between failures.
- O. Network Controller: Digital controller, which supports a family of programmable application controllers and application-specific controllers, that communicates on peer-to-peer network for transmission of global data.
- P. Network Repeater: Device that receives data packet from one network and rebroadcasts it to another network. No routing information is added to protocol.
- Q. Peer to Peer: Networking architecture that treats all network stations as equal partners.
- R. RAM: Random access memory.
- S. Router: Device connecting two or more networks at network layer.

- T. Server: Computer used to maintain system configuration, historical and programming database.
- U. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.
- V. UPS: Uninterruptible power supply.
- W. USB: Universal Serial Bus.
- X. User Datagram Protocol (UDP): This protocol assumes that the IP is used as the underlying protocol.
- Y. VAV: Variable air volume.
- Z. WLED: White light emitting diode.

### 1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site with Owner's representative, Balancing Specialist, and HVAC Prime Contractor. Identify meeting time and date with design professional a minimum of 7 days prior to the meeting taking place.
- B. Include on the Agenda a review of the graphics and control sequences, phasing coordination, and final locations of the workstation.
- C. Record and product meeting minute notes and submit a copy to the design professional.

## 1.6 SEQUENCES OF OPERATION

- A. Central System Control: Occupied/unoccupied shall be determined by the timed event software. The Direct Digital Control, DDC panel shall control the indicated sequence of operation.
- B. Rooftop Air Handling Units (AHU's), Indoor Air Handling Units (AHU's) and Unit Ventilators (UV).
  - 1. General: Provide factory mounted DDC controls and all field installed accessories as required to provide the following basic programmable functions and intended operations. The PI control of installed DDC devices will maintain tight control of temperature and humidity setpoints.
    - a. Provide additional controllers, input/output devices, wiring, programming, etc. to meet the sequences of operation, associated points list, and interface with the building LAN and BMS.
  - 2. Schedule: The BMS will interface with the unit through a DDC that transmits system information (schedules Based, setpoints, etc.) through a communication bus connected to a front-end.

- 3. Warm-up:
  - a. Unit will operate as in the occupied mode of operation except that the outside and exhaust dampers will be fully closed, and the return air damper will be fully open.
- 4. Occupied:
  - a. Setpoints:
    - 1) Space Heating Temperature: 70 deg F (adj).
    - 2) Space Cooling Temperature: 75 deg F, 50% RH (adj).
    - 3) Heating Limiting Temperature Setpoint: 80 deg F (adj.)
  - b. The supply fan will run continuously. The exhaust fan (UV only) will vary based on the amount of the outside air flow.
  - c. The outside air damper will open to minimum position. The return air damper will close a proportionate amount. The exhaust/relief air damper will fully open in response to the outside air damper opening. The exhaust/relief fan will vary based on the amount of the outside airflow damper. Minimum outside air must be maintained during all cycles of operation with the exception of economizer override.
  - d. Cooling mode:
    - 1) When space temperature rises above the cooling setpoint, the economizer will be energized as the first stage of cooling.
    - 2) The economizer controller will check outside air temperature and humidity.
    - 3) When the cooling demand increases more than the economizer mode is capable of, the cooling coil control valve shall modulate open to maintain cooling setpoint and the economizer system shall revert back to minimum outside air.
    - 4) On a drop in temperature, the reverse will occur.
  - e. Heating mode:
    - 1) The supply fan will be at minimum speed.
    - 2) When the space temperature falls below the heating setpoint, the heating coil control valve shall modulate open to maintain heating setpoint.
    - 3) On an increase in temperature, the reverse will occur.
- 5. Unoccupied:
  - a. Setpoints:
    - 1) Space Heating Temperature: 60 deg F (adj).
    - 2) Space Cooling Temperature: 80 deg F (adj).

- b. Cycle Operation: During schedule unoccupied periods, the outside air damper will be in the closed position and the supply and exhaust/relief fans will be deenergized.
- c. Cooling Mode: When space temperature rises above the cooling setpoint temperature, the supply fan will be energized, cooling coil control valve shall modulate open and operate until space temperature falls below this elevated setting. Economizer will operate as the first stage of cooling provided outside air conditions permit.
- d. Heating Mode: When space temperature drops below the night setback temperature, the supply fan will be energized, heating coil control valve shall modulate open and operate until space temperatures rises above the heating setpoint.
- 6. Enthalpy Controlled Economizer: Provide full modulating economizer with adjustable enthalpy changeover. Controller to modulate return and outside air dampers to maintain the desired mixed air temperature, using outside air wet and dry bulb temperatures.
- 7. System Functions and Safeties:
  - a. Freeze stat, located downstream of the heating coil, shall shut down the air handling unit, close the outside air damper, and send an alarm to the BAS. Set freeze stat at 38 deg. F (adj.).

## 1.7 I/O SCHEDULE

System I/O Schedule - Specialist is responsible to review the plans and specification in their entirety to determine the final quantity of control devices and I/O points to provide operational systems of the specified equipment for their intended use.

SYSTEM I/O SCHEDULE		Inputs		Itputs	Interlock	Alarms		
POINT DESCRIPTION		BI	AO	BO	Hardwire	Hi	Low	State
AHU's and UV's								
Unit Status		Х						
Start/Stop				Х				
Supply/Relief Fan Status		Х						
Space Temperature		Х						
Heating Coil Control Valve			Х					
Cooling Coil Control Valve			Х					
Freeze Stat		Х				Х		
Outside, Return, Relief Air Dampers			Х					

### 1.8 ACTION SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications Sections.
- B. Product Data for each type of product specified. Include manufacturer's technical Product Data for each control device furnished, indicating dimensions, capacities, performance characteristics, electrical characteristics, finishes of materials, installation instructions, and startup instructions, including third party equipment data.
- C. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection. Submit damper leakage and flow characteristics, plus size schedule for controlled dampers. Control valve schedule to identify flow characteristics.
- D. Shop Drawings containing the following information for each control system:
  - 1. CAD developed schematic flow diagram showing fans, AHU's, RTU's, DOAS's, unit ventilators, cabinet unit heaters, coils, dampers, valves, control devices, etc. (BMS software developed drawings will not be accepted).
  - 2. Each control device labeled with setting or adjustable range of control.
  - 3. Diagrams for all required electrical wiring. Clearly differentiate between factoryinstalled and field-installed wiring.
  - 4. Details of control panel faces, including controls, instruments, and labeling.
  - 5. Written description of sequence of operation.
  - 6. Trunk cable schematic showing programmable control unit locations and trunk data conductors.
  - 7. Listing of connected data points, including connected control unit and input device.
  - 8. System graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.
  - 9. System configuration showing peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
  - 10. Software description and sequence of operation.
  - 11. Building wiring diagram including panel locations and connection to bus line.
  - 12. Bill of materials.
  - 13. Provide panel layout including controllers, electronic devices and unused I/O's. Include panel dimensions.
  - 14. Provide bus (network) wiring riser diagrams.
  - 15. Provide controller terminal diagrams, points, point names and field device connections, field device points, and field device names. Label and color code wiring connections.
  - 16. Details of third party compatible devices including wiring diagrams, integrators and devices.
- E. Submittal shall consist of:
  - 1. System architecture showing all digital devices.
  - 2. Equipment lists of all proposed devices and equipment including data sheets of all products, including third party equipment.

- 3. Valve, damper, and well and tap schedules showing size, configuration, capacity and location of all equipment.
- 4. Wiring and piping interconnection diagrams including panel and device power and sources, including third party diagrams, with terminal point designation for each wire connection.
- F. Wiring diagrams detailing wiring for power, signal, and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.
- G. Maintenance data for control systems equipment to include in the operation and maintenance manual. Include the following:
  - 1. Maintenance instructions and spare parts lists for each type of control device and compressed-air stations (if required).
  - 2. Interconnection wiring diagrams with identified and numbered system components and devices.
  - 3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
  - 4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
  - 5. Calibration records and list of set points.
- H. Field Test Reports: Procedure and certification of the control system, communication wiring, sensor wiring, and all bus wiring.
- Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors. Revise Shop Drawings to reflect actual installation and operating sequences, including all third party vendor information. Provide all BMS files developed specifically for installed system such as graphics, control programming and network communications.
- J. Software Manuals: The software manual shall describe programming and testing, starting with a system overview and proceeding to a detailed description of each software feature. The manual shall instruct the user on programming or re-programming any portions of the BMS. This shall include all control programs, algorithms, mathematical equations, variables, set points, time periods, messages, and other information necessary to load, alter, test and execute the system. The manual shall include:
  - 1. Complete description of programming language, including commands, editing and writing control programs, algorithms, printouts and logs, mathematical calculations and passwords.
  - 2. Instructions on modifying any control algorithm or parameter, verifying errors, status, changing passwords and initiating or disabling control programs.
- K. Software Documentation: All software programs shall be easily referenced from summary sheets which compare control programs with pertinent information about hardware and wiring information in the field. Documentation shall include:
  - 1. Complete point identification, including terminal number, symbol, engineering units and control program reference number.

- 2. Field information including location, device, device type and function, electrical parameters and installation drawing number.
- 3. Location identification BMS control hardware.
- L. Software: Upon successful completion of the operational acceptance test, provide a medium, and hardware for bulk storage of the accepted versions and an untranslated (not complied) copy of the program database.
- M. Commissioning Summary Forms: Provide data summary forms to be approved by the Engineer to define the following information for inclusion into the BMS for each point in the system by the ATC Specialist:
  - 1. Description of each piece of equipment and the functions to be controlled.
  - 2. For each BMS function, a listing of digital and/or analog hardware required to interface the BMS to the equipment.
  - 3. Listing of all digital and analog alarms.
  - 4. Listing of all BMS application programs associated with each piece of equipment. This listing shall include all control algorithms and mathematical equations. The listing shall be in easy to understand English format.
- N. All application programs must be submitted. No unauthorized BMS manufacturers proprietary control front-ends will be accepted.
- O. BMS Manufacturer authorized Contractors must submit letter or contract from specified manufacturer indicating authorization from contracting firm to procure, install and service specified manufacturer's equipment.
- P. Licenses, guarantees, and warranty documents for equipment and systems.

## 1.9 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For DDC system to include in emergency, operation and maintenance manuals.
  - 1. In addition to items specified in applicable Division 01 sections include the following:
    - a. Project Record Drawings of as-built versions of submittal Shop Drawings provided in electronic PDF format.
    - b. Testing and commissioning reports and checklists of completed final versions of reports, checklists, and trend logs.
    - c. As-built versions of submittal Product Data.
    - d. Names, addresses, e-mail addresses and 24-hour telephone numbers of Installer and service representatives for DDC system and products.
    - e. Operator's manual with procedures for operating control systems including logging on and off, handling alarms, producing point reports, trending data, overriding computer control and changing set points and variables.

- f. Programming manuals with description of programming language and syntax, of statements for algorithms and calculations used, of point database creation and modification, of program creation and modification, and of editor use.
- g. Engineering, installation, and maintenance manuals that explain how to:
  - 1) Design and install new points, panels, and other hardware.
  - 2) Perform preventive maintenance and calibration.
  - 3) Debug hardware problems.
  - 4) Repair or replace hardware.
- h. Documentation of all programs created using custom programming language including set points, tuning parameters, and object database.
- i. Backup copy of graphic files, programs, and database on electronic media such as DVDs.
- j. List of recommended spare parts with part numbers and suppliers.
- k. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.
- I. Complete original-issue copies of furnished software, including operating systems, custom programming language, operator workstation software, and graphics software.
- m. Licenses, guarantees, and warranty documents.
- n. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.
- o. Owner training materials.

## 1.10 QUALITY ASSURANCE

- A. Prime Contractor Qualifications: Engage an experienced specialist specializing in direct digital control system installations. Specialist shall be certified in writing by BMS manufacturer.
- B. Manufacturer Qualifications: Engage a firm experienced in manufacturing control systems similar to those indicated for this Project and that have a record of successful in-service performance.
- C. The complete BMS installation shall be in strict accordance to the national and local electrical codes and the electrical section of these specifications. All devices designed for or used in line voltage applications shall be UL listed. All microprocessor based remote and central devices connection onto the primary bus (including link devices) shall be UL864 Listed.
- D. Provide satisfactory operation without damage at 110% above and 85% below rated voltage and at 3 hertz variation in line frequency. Provide static, transient, and short circuit protection on all inputs and outputs. Communication lines shall be protected against incorrect wiring, static transients lightning strikes, and induced magnetic interference. All bus connected devices shall be a.c. coupled, or equivalent so that any single device failure will not disrupt or halt bus communication. Surge suppression and isolations devices shall be provided.

- E. Startup Personnel Qualifications: Engage specially trained personnel in direct employ of manufacturer of primary temperature control system. Personnel shall be capable of administering training, system diagnostics, and trouble shooting.
- F. Comply with NFPA 90A.
- G. Comply with NFPA 70.
- H. Coordinate equipment selection with applicable Division 26 Sections to achieve compatibility with equipment that interfaces with the fire alarm system.
- All wiring between controller and sensors and control devices including any power wiring of devices and necessary conduit shall be provided under this section of the specification. All control and power wiring which is provided under this section of the specification shall be in accordance with requirements set forth in the National Electrical Code (NEC) latest edition.

## 1.11 CONDITIONS:

- A. Bids by Wholesalers, Contractors, Franchised Dealers or any firm whose principal business is not that of installing automatic temperature control systems shall not be acceptable.
- B. The system shall be engineered, programmed, and installed by personnel trained and regularly employed by the BMS manufacturer, or certified contractors.
- C. Manufacturer and specialist shall have an in-place support facility within 100 miles of the site with technical staff, spare parts inventory and all necessary test and diagnostic equipment.

## 1.12 DELIVERY, STORAGE, AND HANDLING

- A. Store equipment and materials inside and protected from weather.
- B. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping control devices to unit manufacturer and in factory testing of components installed in designated equipment.

## 1.13 COORDINATION

- A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.
- B. Coordinate supply of conditioned electrical branch circuits for control units and operator workstation.
- C. Coordinate equipment with applicable Division 26 Sections to achieve compatibility with starter coils and annunciation devices for panelboards.

D. Coordinate equipment with applicable Division 26 Sections to achieve compatibility with motor starters and annunciation devices.

### 1.14 WARRANTY

- A. Warrant labor and materials for specified control system free from defects for a period of 12 months after project substantial completion. Control system failures during warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to Owner. Respond during normal business hours within 24 hours of Owner's warranty service request.
- B. Work shall have a single warranty date, even if Owner received beneficial use due to early system start-up. If specified work is split into multiple contracts or a multi-phase contract, each contract or phase shall have a separate warranty start date and period.
- C. Provide an extended service contract beyond first year warranty period if so desired by Owner.

## PART 2 - PRODUCTS

#### 2.1 EXISTING BMS SYSTEM

- A. Confirm with District.
- B. Connect to existing DDC panels. If additional equipment is required, provide as required.

#### 2.2 MANUFACTURERS

- A. Acceptable manufacturers/Authorized Installer: According to District's BMS Provider.
- B. Building Management System Architecture:
  - 1. The BMS system architecture will be BACnet top to bottom with a web base server/controller.
  - 2. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ASHRAE/ANSI Standard BACnet.
  - 3. Web server and controllers shall communicate using BACnet protocol. Web server network backbone shall communicate using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing as specified in ASHRAE/ ANSI 135, BACnet Annex J. Provide data drop for IT/internet access.
  - 4. The network shall be based on a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards shall be standard "off the shelf" products available through normal PC vendor channels. All controllers on the BMS shall communicate via BACnet MS/TP protocol. The BMS shall network multiple user interface clients, universal network controllers, system controllers and application-specific controllers.

- 5. Access to system shall not be restricted by the hardware configuration of the building management system. The hardware configuration of the BMS shall be totally transparent to the user when accessing data or developing control network programs from either over the IT LAN or remote access.
- 6. Controller/panels to be wired to the server and the server to be connected to IT LAN for remote access. Provide an Ethernet drop for connection to School District's IT LAN at each school.
- 7. Controller/panels to be wired to the master CPU serve and connected to IT LAN for front-end access. Provide an Ethernet drop for connection to IT LAN, BMS programming and provide technical support for setup and interface with the IT LAN. The Owner will provide a fixed IP Address, Domain and IT LAN system programming to facilitate BMS access through the LAN/Firewall to the WAN for remote access.
- 8. Graphics will be developed using the manufacturer's graphics software. Coordinate graphics with the Owner.
- 9. BMS is to be a full open system for modification and upgrades, and is the licensed Institution with all password knowledge.
- 10. Provide gateway interface in appropriate protocol as required.
- 11. Provide LCD access at the master panels (2).
- 12. Provide pump variable frequency drives that are fully functional with installed control system.
- 13. Building controls to be tied into front-end.

# 2.3 DDC SYSTEM DESCRIPTION

- A. Microprocessor-based monitoring and control including analog/digital conversion and program logic. A control loop or subsystem in which digital and analog information is received and processed by a microprocessor, and digital control signals are generated based on control algorithms and transmitted to field devices to achieve a set of predefined conditions.
  - 1. DDC system shall consist of a high-speed, peer-to-peer network of distributed DDC controllers, other network devices, operator interfaces, and software.
- B. 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.

## 2.4 CONTROLLER HARDWARE

- A. The Building Management System (BMS) shall integrate multiple building functions including equipment supervision and control, alarm management, energy management and historical data collection.
- B. The system shall be a modular distributed control system. Expansion in capacity and functionality shall be provided through the addition of sensors, actuators, standalone DDC panels and operator devices.
- C. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC panel/controller shall operate independently by

performing its own specified control, alarm management, operator I/O, and historical data collection functions. The failure of any single component or network connection (including a wire break) shall not interrupt the execution of any control strategy, reporting, alarming and trending function, or any function at any operator interface device.

- D. Network Control Units shall be highest available capacity with a minimum 32-bit microprocessor based within panel operating system. DDC programs and data files shall be non-volatile memory or flash memory to allow simple and reliable additions and changes. Each unit shall have an on-board 30-day battery backed real-time clock. Unit(s) shall be provided where shown or specified with capacity to accommodate input/output (I/O) points required for the application. Each panel shall be provided with a socket for a Portable Network Terminal, and a port for network communications. Units outputs shall be binary for On-Off control, and true variable voltage (0-10v) for driving analog or pneumatic transducer devices. Analog outputs shall have a minimum incremental resolution of one percent of the operating range of the controlled device. Units shall have LEDs for continuous indication of all bus communications, power, and operational status. All panel electronics and associated equipment shall be installed in suitable enclosures.
- E. DEC (Digital Electronic Controllers) control modules or unit specific DDC controllers shall be UL916 standalone digital based configured to perform the sequences specified, and with I/O selected for the application. Controller enclosures shall be compact plastic conforming to UL94-5V or plated steel. Each device shall be provided with LED type annunciation to continually display its operational mode; power, normal, or in an alarm state.
- F. Network terminal shall be provided for mounting in network control panel.
- G. System integrator shall monitor and control all third party equipment. HVAC Contractor and ATC Specialist shall coordinate all devices and determine unit mounted third party items vs. field installed devices

## 2.5 SYSTEM SOFTWARE

- A. Control Software:
  - 1. Time Programs: Each control unit shall contain up to 20 unique user modifiable time programs (TP). Each TP shall consist of daily, weekly, and annual programs plus a "TODAY" temporary function. DAILY programs shall be definable for day types such as working day, half day, holiday, weekend, etc. Each daily program shall allow a list of time based (or optimum time based) analog and digital commands to be issued to user selected plant elements and points. WEEKLY programs shall allow a user selected set of daily programs to be defined for each day of the week (Monday through Sunday). The ANNUAL program shall initially be an automatic compilation of 52 weekly programs. Selecting a date of the ANNUAL program shall allow modification of the daily selection entered into the weekly program (such as changing Dec. 25 from a working day to a holiday).
  - 2. Control Application Software shall be customized to meet the detailed requirements of the "Sequence of Operation". Control units, control modules and unit specific controllers network management devices shall be programmable. All BMS control

software shall be designed via a graphic programming facility, the flow chart output of which shall be provided as system documentation.

- 3. In addition to Proportional, Proportional-Plus-Integral (PI), and Proportional-Plus-Integral-Plus-Derivative (PID) algorithms, an HVAC enhanced PID (EPID) algorithm shall be provided and implemented where specified. The EPID shall be a full PID, but modified and/or appended to perform as follows:
  - a. The user shall be allowed to specify a start output value to which subsequent corrective signals are added. For example, a variable speed pump may be specified to start at 20% to assure a timely proof-of-operation signal to result without false failure-to-respond alar ms being issued during slow startups; or a discharge air EPID loop may be specified to start at 33% (at which point the heating and cooling valves and the outside air damper are all closed) and enter into control without overshoot or undershoot.
  - b. The user shall be allowed to specify a start-up ramp duration of 1 to 300 seconds, during which time the error (EPID set point minus EPID input) varies from 0 to the actual value, thus allowing gradual and direct assumption of control with no hunting, overshoot, or undershoot. Ramping of the PID output (which will cause integral wind-up) is not allowed.
  - c. The EPID shall be provided with a limit signal port such that the connection of an external limit signal (such as providing a fan discharge pressure high limit signal into a VAV duct static pressure control EPID) allows the limit signal to override the EPID without integral windup occurring during the limit-control period.
- B. Management Software:
  - 1. Trending: In addition to supporting temperature and humidity trending specified elsewhere, each network control unit shall be provided with a trend archive of at least the last 8000 events (digital transitions or analog value changes) of any user selected group of up to 50 points. A stored event shall include date and time, and value or status. Events occurring in excess of 8000 shall overwrite the oldest events.
  - 2. Alarms: BMS shall monitor and report all analog input points and specified digital points for off-normal conditions. Each alarm shall have an "alarm delay" attribute which shall determine how long (in seconds) a point must be off-normal prior to being considered in an alarm state.
  - 3. DEC Support: Network control units and devices managing sub-networks of DECs shall report DEC alarms and shall be programmed to perform data reduction, sorting, and optimizing routines.

## 2.6 SOFTWARE

A. Software shall be configured to meet the requirements of the "Sequence of Operation" specified and shall be field reconfigurable. Software shall support full PID control, and shall utilize separate PID gains for heating and cooling. Where space sensors are provided with temperature set point knobs, DDC controllers shall be provided with unique software set point limits. Each controller shall have continuously running hardware diagnostics to detect

malfunctions of the flow sensor, the temperature sensor, the remote set point sensor, and the A to D converter.

B. Controllers shall have preconfigured air flow calibration software to assist the test and balance (TAB) specialist in final calibrations. Using the DEC contractors calibration tool, the TAB Specialist shall be provided with a display allowing a simple command entry to place the DEC in zero, minimum, and maximum CFM control modes. At each mode, a display field shall be provided for the T&B Specialist to enter the actual measured value in CFM. Upon completion of entering the three values, the DEC shall automatically recalibrate based upon the actual values

## 2.7 DATA COMMUNICATIONS

- A. All network control unit and DEC network management devices shall be interconnected and tied into the communications network. DECs shall also be connected together via secondary networks managed by network management devices to provide data concentration and parallel processing such that system expansion does not noticeably affect system response. All communications shall be via three wire, shielded where required, RS-485. DDC microprocessor failures shall not cause loss of communications of the remainder of any network. All networks shall support sensor sharing, global application programs, and bus-to-bus communications in a true peer-to-peer token passing manner.
- B. For reliability, maintainability, and performance communication busses shall be extendible to 4000 feet without active links, hubs, or repeaters.
- C. DECs shall be managed by network management devices to provide alarm detection and reporting, data sharing, trending, and response to data requests and commands.

## 2.8 COLLECTION AND ANALYSIS OF HISTORICAL DATA

- A. Provide trending capabilities that allow the user to easily monitor and preserve records of system activity over an extended period of time. Any system point may be trended automatically at time-based intervals or changes of value, both of which shall be userdefinable. Trend data must be automatically stored on hard disk for future diagnostics and reporting.
- B. Trend data report graphics shall be provided to allow the user to view all trended point data. Reports may be customized to include individual points or pre-defined groups of at least 6 points. Provide additional functionality to allow any trended data to be transferred easily to an off-the-shelf spreadsheet package such as Excel. This shall allow the user to perform custom calculations such as energy usage, equipment efficiency and energy costs and shall allow for generation of these reports on high-quality plots, graphs and charts.
- C. Provide additional functionality that allows the user to view trended data on trend graph displays. Displays shall be actual plots of both static and/or real-time dynamic point data. A minimum of 4 points may be viewed simultaneously on a single graph, with color selection and line type for each points being user-definable. Displays shall include an 'X' axis indicating

elapsed time and a 'Y' axis indicating a range scale in engineering units for each point. The 'Y' axis shall have the ability to be manually or automatically scaled at the user's option. Different ranges for each point may be used with minimum and maximum values listed at the bottom and top of the 'Y' axis. All 'Y' axis data shall be color-coded to match the line color for the corresponding point.

- 1. Static graphs shall represent actual point data that has been trended and stored on disk. Exact point values may be viewed on a data window by pointing or scrolling to the place of interest along the graph. Provide capability to print any graph on the system printer for use as a building management and diagnostics tool.
- 2. Dynamic graphs shall represent real-time point data. Any point or group of points may be graphed, regardless of whether they have been predefined for trending. The graphs shall continuously update point values. At any time the user may redefine sampling times or range scales for any point. In addition, the user may pause the graph and take "snapshots" of screens to be stored on the workstation disk for future recall and analysis. As with static graphs, exact point values may be viewed and the graphs may be printed.

## 2.9 DYNAMIC COLOR GRAPHIC DISPLAYS

- A. Color graphic floor plan displays and system schematics for each piece of mechanical equipment. Provide optimize system performance analysis and speed alarm recognition as required by the Owner and this specification.
- B. The operator interface shall allow users to access the various system schematics and floor plans via a graphical penetration scheme, menu selection or text-based commands.
- C. Dynamic temperature values, humidity values, flow values and status indication shall be shown in their actual respective locations and shall automatically update to represent current conditions without operator intervention.
- D. The windowing environment of the PC operator workstation shall allow the user to simultaneously view several graphics at a time to analyze total building operation or to allow the display of a graphic associated with an alarm to be viewed without interrupting work in progress.
- E. Provide a dynamic display of the site specific BMS architecture indicating the status of all controllers, PC workstations and networks.

## 2.10 ELECTRIC AND MECHANICAL DEVICES

A. Provide Building Controllers (BC), Advanced Application Controllers (AAC), Application Specific Controllers (ASC), Smart Actuators (SA), and Smart Sensors (SS) as required to achieve performance specified Article System Performance. Every device in the system which executes control logic and directly controls HVAC equipment must conform to a standard BACnet Device Profile as specified in ASHRAE/ANSI 135-2003, BACnet Annex L. Unless otherwise specified,

hardwired actuators and sensors may be used in lieu of BACnet Smart Actuators and Smart Sensors.

- B. All electric switch devices shall be selected for the applied load and UL listed for the application. Miscellaneous, electric, pneumatic, and mechanical devices shall include:
  - 1. Automatic control valves 2 1/2 " and smaller shall be screwed type, and valves 3" and larger shall be flanged. Valves shall be ANSI-rated to withstand the pressures and temperatures encountered. Valves shall have stainless-steel stems and spring loaded Teflon packaging with replaceable discs.
    - a. All modulating straight-through water valves shall be provided with equalpercentage contoured throttling plugs. Valves shall be sized for a pressure drop equal to the coil they serve but not to exceed 4 psi.
    - b. Unitary valves shall be straight-through type as specified in the sequence of operation. Stems shall be polished stainless-steel and packing shall be ethylene-propylene suitable for both chilled water service. Pressure ratings shall be as required for the intended service.
- C. All automatically controlled devices, unless specified otherwise elsewhere, shall be provided with electric actuators sized to operate their appropriate loads with sufficient reserve power to provide smooth modulating action or two-position action and tight close-off.
- D. Transformers: Provide step-down control transformers where required to power controls. Control transformers shall be sized such that 80% of the rated capacity equals the connected load.

## 2.11 ACTUATORS

- A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or 2-position action.
  - 1. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
  - 2. Nonspring-Return Motors for Valves Larger than 2-1/2 Inches: Size for running torque of 150 inch-pounds and breakaway torque of 300 inch-pounds.
  - 3. Spring-Return Motors for Valves Larger than 2-1/2 Inches: Size for running and breakaway torque of 150 inch-pounds.
  - 4. Nonspring-Return Motors for Dampers Larger than 25 sq. ft.: Size for running torque of 150 inch-pounds and breakaway torque of 300 inch-pounds.
  - 5. Spring-Return Motors for Dampers Larger than 25 sq. ft.: Size for running and breakaway torque of 150 inch-pounds.
## 2.12 DATA INPUTS AND OUTPUTS

- A. Input/output sensors and devices shall be closely matched to the requirements of the remote panel for accurate, responsive, noise-free signal input/output. Control input response shall be high sensitivity and matched to the loop gain requirements for precise and responsive control.
- B. Temperature sensors shall be thermistor type of 10,000 ohm at 77deg F, equal to PreCon Type III. Sensors shall have + or 0.36 deg F accuracy between 32deg F and 158 deg F.
  - 1. DEC space temperature sensors shall be provided with blank commercial type locking covers with the following features:
    - a. Sensors shall be provided with plug-in port to respective network for software maintenance and/or reconfiguration. Each part to be wired for communication. Plastic used on subbase or housing shall be UL94-5V rated.
    - b. Do not included override switch to initiate change from unoccupied to occupied mode.
    - Do not include setpoint adjustment by occupant limited by programmable range +/- setting (do not provide temperature gradients, provide tick marks), unless otherwise noted.
    - d. Do not provide LED display, unless otherwise noted.
    - e. Space sensors to be sensor type only where adjustments are made through frontend, unless otherwise noted.
    - f. Space temperature adjustments and displays shall be provided for all locations. Duct temperature sensors shall be rigid stem or averaging type as specified in the sequence of operation. Water sensors shall be provided with a separable copper, monel or stainless-steel well.
  - 2. Outside Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
- C. Current sensing relays used for proof-of-loading for fans and pumps shall be suitable for 2 to 200 amperes and shall have adjustable trip thresholds of plus or minus two percent of range. Each relay shall be provided with an LED to allow ready observation of the relay status.
- D. All Inputs and Outputs (including I/O Summary) shall be displayed and commandable from all workstations, including all off-site PC computers.
- E. Provide field mounted differential pressure sensor transmitter as indicated on the plans. Unit shall transmit an isolated 4-20 mA DC signal indicative of process variable to the pump logic controller via standard two wire 24 DC system. Unit shall have stainless steel wetted parts with two 0.25" male NPT process connections. It shall be protected against radio frequency interference and shall have a watertight, NEMA 4 electrical enclosure capable of withstanding 2000 PSI static pressure with a 0.5" NPT conduit connection. Accuracy shall be within 0.25% of full span.
- F. Humidity Sensors: Bulk polymer sensor element.
  - 1. Duct and room sensors shall have a sensing range of 20%-80%.
  - 2. Duct sensors shall have a sampling chamber.

- 3. Outdoor air humidity sensors shall have a sensing range of 20%-95% RH and shall be suitable for ambient conditions of 40 deg F -170 deg F.
- 4. Humidity sensors shall not drift more than 1% of full scale annually.
- G. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, temperature compensated.
  - 1. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
  - 2. Output: 4 to 20 mA.
  - 3. Building Static-Pressure Range: 0 to 0.25 inch wg.
  - 4. Duct Static-Pressure Range: 0 to 5 inches wg.
- H. All Inputs and Outputs (including I/O Summary) shall be displayed and commandable from all workstations, including off-site PC computers.
- I. Relays:
  - 1. Control Relays: Control relays shall be plug-in type, UL listed, and shall have dust cover and LED "energized" indicator. Contact rating, configuration, and coil voltage shall be suitable for application.
  - 2. Time Delay Relays. Time delay relays shall be solid-state plug-in type, UL listed, and shall have adjustable time delay. Delay shall be adjustable +/-100% from setpoint shown. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA 1 enclosure for relays not installed in local control panel.
- J. Current Transformer:
  - 1. AC current transformer shall be UL/CSA recognized and shall be completely encased (except for terminals) in approved plastic material.
  - 2. Transformers shall be available in various current ratios and shall be selected for +/-1% accuracy at 5 A full-scale output.
  - 3. Use fixed-core transformers for new wiring installation and split-core transformers for existing wiring installation.
- K. Voltage Transmitters:
  - 1. AC voltage transmitters shall be self-powered single-loop (two-wire) type, 4-20 mA output with zero and span adjustment.
  - 2. Adjustable full-scale unit ranges shall be 100-130 Vac, 200-250 Vac, 25-330 Vac, and 400-600 Vac. Unit accuracy shall be +/-1% full-scale at 500 ohm maximum burden.
  - 3. Transmitters shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized at 600 Vac rating.
- L. Voltage Transformers:
  - 1. AC voltage transformers shall be UL/CSA recognized, 600 Vac rated, and shall have builtin fuse protection.
  - 2. Transformers shall be suitable for ambient temperatures of 40 deg F 130 deg F and shall provide +/-0.5% accuracy at 24 Vac and 5 VA load.

- 3. Windings (except for terminals) shall be completely enclosed with metal or plastic.
- M. Carbon Dioxide Sensor and Transmitter: Single detectors using solid-state infrared sensors; suitable over a temperature range of 23 to 130 deg F and calibrated for 0 to 2 percent, with continuous or averaged reading, 4- to 20-mA output; for wall mounting.

## 2.13 CONTROL PANELS

- A. Local Control Panels: Unitized cabinet with suitable brackets for wall or floor mounting, located adjacent to each system under automatic control. Provide common keying for all panels.
  - 1. Fabricate panels of 0.06-inch-thick, furniture-quality steel, or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock, with manufacturer's standard shoppainted finish and color.
  - 2. Panel-Mounted Equipment: Temperature relays, and automatic switches; except safety devices.
  - 3. Provide clear plastic pocket bonded to door and copies of as-built control diagrams, wiring diagrams, and sequences of operation enclosed inside pocket

## PART 3 - EXECUTION

#### 3.1 GENERAL

A. The BMS shall be designed, installed, and commissioned in a turnkey operational manner; including all labor not noted in Work by Others paragraph of PART I of this section of these specifications, and not noted in other sections of these specifications.

### 3.2 EXAMINATION

A. Verify that conditioned power supply is available to control units and operator workstation. Verify that field end devices, wiring, and communication network are installed before proceeding with installation. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.3 DATA CONTROL (D/C) AND GRAPHICS SUMMARY

A. All hardware, custom software, application software, graphics, etc., necessary to accomplish the control sequences and display the graphics specified shall be provided as part of this contract. Provide all controllers, inputs, outputs, valves, dampers, actuators and flow meters required to provide the control and graphic data described. Provide software set points required for display in logical groups and graphics.

- B. Each digital output shall have a software-associated monitored input. Any time the monitored input does not track it's associated command output within a programmable time interval, a "command failed" alarm shall be reported.
- C. Where calculated points (such as CFM) are shown, they shall appear in their respective logical groups.
- D. Unless otherwise specified or approved prior to bidding, the primary analog input and the analog output of each DDC loop shall be resident in a single remote panel containing the DDC algorithm and shall function independent of any primary or DEC communication links. Secondary (reset type) analog inputs may be received from the primary network, but approved default values and/or procedures shall be substituted in the DDC algorithm for this secondary input if network communications fail or if the secondary input becomes erroneous or invalid.
- E. The graphics shall be displayed on workstations.

# 3.4 DATA ENTRY

- A. Perform all data entry into the Building Management System, in consultation with the Owner. The following data shall be reviewed with the Owner and specific information developed as a prerequisite to data entry.
  - 1. Occupancy Schedules.
  - 2. Alarm Limits (high, low and critical).
  - 3. All temperature setpoints for occupied and unoccupied times.
  - 4. Passwords and priority levels.
  - 5. Alarm and maintenance messages.
  - 6. All input and output point names and symbols, including specific names indicated in this specification section.
- B. As needed, changes in the programming shall be performed by the Specialist using dial-up telephone access.

## 3.5 INSTALLATION

- A. All wiring shall be properly supported and run in a neat and workmanlike manner. All wiring exposed and in equipment rooms shall run parallel to or at right angles to the building structure. All wiring within enclosures shall be neatly bundled and anchored to prevent obstruction to devices and terminals. All wiring shall be in accordance with all local and national codes. All line voltage wiring, all wiring exposed, and all wiring in equipment rooms shall be installed in conduit in accordance to the electrical specifications. All electronic wiring shall be #18 AWG minimum THHN and shielded if required, except standard network (Ethernet, Eschelon, etc.) cabling shall be as tested and recommended.
- B. Communication network shall be an overall shielded cable to prevent electrical noise from interfering with data transmission. All network cable splices shall be at controller locations. Splices elsewhere in the communication network are not acceptable.

- C. Enter all computer data into the related computers including all graphics, control programs and initial approved parameters and settings, and English descriptors. Maintain USB drive copies of all data file and application software for reload use in the event of a system crash or memory failure including an untranslated copy (2nd copy provided to Owner). One copy shall be delivered to the Owner during training sessions, and one copy shall be archived in the BMS Specialist's local software vault.
- D. Install equipment as indicated to comply with manufacturer's written instructions.
- E. Verify location of space sensors, thermostats, and other exposed control sensors with plans and room details before installation. Locate concealed type space sensors 60 inches above floor, otherwise, 48 inches above floor from center of highest operable adjustment control in accordance to ADA requirements. Space mounted devices are to be identical in appearance. All devices shall be mounted under the same style cover.
- F. Install labels and nameplates to identify control components according to Division 23 Sections specifying mechanical identification.
- G. Install hydronic instrument wells, valves, and other accessories according.
- H. Install controls so that adjustments and calibrations can be readily made. Controls are to be installed by the control equipment manufacturer.
- I. Provide all relays, switches, sources of electricity and all other auxiliaries, accessories and connections necessary to make a complete operable system in accordance with the sequences specified.
- J. Patch all ductwork and floor penetrations resulting in either equipment removal or new work. Patch to match existing materials and finishes.
- K. Install labels and nameplates to identify control components according to applicable Division
  23 Sections specifying mechanical identification.
- L. Install control valves horizontally with the power unit up.
- M. General System Requirements:
  - 1. Time of Day Scheduling
    - a. The Building Management System (BMS) shall be programmed to start and stop the HVAC equipment based on occupancy schedules coordinated with the Owner. The BMS shall also provide equipment interlocks as required.
  - 2. All safeties shall be automatically and remotely reset from BMS.
  - 3. All setpoints shall be adjustable from BMS console via single point commands.
  - 4. All reset schedule parameters shall be adjustable from BMS console via single point commands.

## 3.6 ELECTRICAL WIRING AND CONNECTIONS

- A. Install raceways, boxes, and cabinets according to applicable Division 26 Section.
- B. Install building wire and cable according to applicable Division 26 Section.
- C. Install signal and communication cable according to BMS manufacturer's written instructions.
  - 1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
  - 2. Install exposed cable in raceway.
  - 3. Install concealed cable in raceway.
  - 4. Bundle and harness multiconductor instrument cable in place of single cables where a number of cables follow a common path.
  - 5. Fasten flexible conductors, bridging cabinets and doors, neatly along hinge side; protect against abrasion. Tie and support conductors neatly.
  - 6. Number-code or color-code conductors, except local individual room controls, for future identification and servicing of control system.
- D. Connect electrical 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.
- E. Connect manual reset limit controls independent of manual control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.
- F. Connect HAND-OFF-AUTO selector switches to override automatic interlock controls when switch is in HAND position.
- G. Provide and install low voltage transformers connected to spare circuits in electrical panels. Install power wiring from spare breaker to transformer. Run all low voltage control wiring.
- H. Provide 120V power to all ATC panels not shown on the Electrical Documents, required by the ATC system.

#### 3.7 START-UP

- A. Manufacturer's Field Services: Provide the services of a factory-authorized service representative to start control systems, load all software, configure network communications, inspect installation of HVAC equipment, obtain and coordinate third party controls, and provide a written report.
- B. The BMS Specialist shall completely check out, calibrate and test all connected hardware and software to insure that the system performs in accordance with the approved specifications and sequences of operation approved.

- C. Witnessed acceptance demonstration shall display and demonstrate each type of data entry to show site specific customizing capability; demonstrate parameter changes; execute digital and analog commands; and demonstrate DDC loop stability via trend of inputs and outputs, verify component's address and communication loop functions.
- D. Test and adjust controls and safeties. Provide copies of alarm logs to verify alarm operation.
- E. Replace damaged or malfunctioning controls and equipment.
- F. Start, test, and adjust control systems. Provide programming of schedules and operating units after consultant with Owner's Representative and Building's Operating Personnel.
- G. Demonstrate compliance with requirements.
- H. Adjust, calibrate, and fine tune circuits and equipment to achieve sequence of operation specified.
- I. Assist testing, balancing, and adjusting specialist.

## 3.8 ATC COMMISSIONING

- A. Manufacturer's Field Services: Provide the services of a factory-authorized service representative to start control systems.
- B. The ATC Specialist shall perform a commissioning procedure consisting of field I/O calibration and commissioning, system commissioning and integrated system program commissioning. Document all commissioning information on commissioning data sheets which shall be submitted to the engineer. The commissioning must be coordinated with the Owner to ensure systems are available when needed. Notify the Owner in writing of the testing schedule so that authorized personnel from the Owner are present throughout the commissioning procedure.
  - 1. Field I/O Calibration and Commissioning: Prior to system program commissioning, verify that each control panel has been installed according to plans, specifications and approved shop drawings. Test, calibrate and bring on line each control sensor and device. Commissioning to include, but not limited to:
    - a. Sensor accuracy at setpoint.
    - b. Sensor range.
    - c. Verify analog limit and binary alarm reporting.
    - d. Point value reporting.
    - e. Binary alarm and switch settings.
    - f. Actuator and positioner spring ranges.
    - g. Fail safe operation on loss of control signal, electric power, network communications, etc.
  - 2. Record calibration and test data on commissioning data sheets. Sufficient space should be provided near each point name for sign off.

- 3. Comply with standards and documentation formats as indicated in ASHRAE Guidelines 1989 for commissioning of HVAC systems.
- 4. Submit completed (description filled-in) "Input/Output Summary Table" to Engineer as shown in ASHRAE Guidelines prior to commissioning for Engineer's review. Commissioning shall not start until Specialist receives approved data sheets from Engineer.
- C. System Programming Commissioning:
  - 1. After control devices have been commissioned (i.e. calibrated, tested and signed off), each DDC program shall be put on line and commissioned. The Specialist shall, in the presence of Owner personnel, demonstrate each programmed sequence of operation and compare the results in writing. In addition, each control loop shall be tested to verify proper response and stable control, within specified accuracy's. System program test results shall be recorded on commissioning data sheets and submitted for record. Any discrepancies between the specification and the actual performance will be immediately rectified and retested.
- D. Integrated System Commissioning:
  - 1. After all DDC programs have been commissioned, the Specialist shall verify the overall system performance as specified. Tests shall include, but not be limited to:
    - a. Data communication, both normal and failure modes.
    - b. Impact of component failures on system performance and system operation.
    - c. Time/Date changes.
    - d. Global application programs and point sharing.
    - e. System backup and reloading.
    - f. System status displays.
    - g. Diagnostic functions.
    - h. Power failure routines.
    - i. Battery backup.
    - j. Testing of all electrical and HVAC systems. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

## 3.9 INSTRUCTION OF OWNER'S PERSONNEL

- A. Provide the services of controls manufacturer's authorized instructors who will give full instruction to designated personnel in the operation, maintenance and programming of the DDC system. Orient the training specifically to the system installed rather than a general training course. Instructors shall be thoroughly familiar with the subject matter they are to teach. A minimum of twenty-four (16) hours of training shall be provided. One (1) eight (8) hour training sessions shall be conducted at system completion, and the other one (1) eight (8) hour (two sessions) shall be conducted forty-five (45) days after system completion.
- B. Training on the functional operation of the system shall include.

- 1. Operation of equipment.
- 2. Programming.
- 3. Diagnostics.
- 4. Failure recovery procedures.
- 5. Alarm formats (where applicable).
- 6. Modifying text and graphics.
- 7. Password assignment and modifications
- 8. Report eventing and modification.
- 9. Sequence of Operation review.
- 10. Use of operators' terminals.
- 11. Maintenance and calibration.
- 12. Trouble shooting, diagnostics, and repair instructions.
- C. Provide an additional twenty-four (24) hours of programming time for Owner requirements and sequencing refinement. During the first year of operation, trends and equipment operations reports are to be used as a tool in determining actual operating characteristics of the building which will allow setpoint adjustments and modification of software programming to adapt to the building's operating parameters.

# END OF SECTION 230923

## **SECTION 232113 - HYDRONIC PIPING**

### 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 pipe and fitting materials and joining methods for the following:
  - 1. Chilled water piping.
  - 2. Heating water piping.
  - 3. Condensate piping.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of the following:
  - 1. Pipe.
  - 2. Fittings.
  - 3. Joining materials.

### 1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Piping layout, drawn to scale. Refer to Section 230010.

#### PART 2 - PRODUCTS

#### 2.1 COPPER TUBE AND FITTINGS

- A. Drawn-Temper Copper Tubing: ASTM B 88, Type L for chilled and heating water piping.
- B. DWV Copper Tubing: ASTM B 306, Type DWV for condensate drainage piping.
- C. Wrought-Copper Unions: ASME B16.22.

### 2.2 JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

### PART 3 - EXECUTION

#### 3.1 PIPING INSTALLATIONS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping to permit valve servicing.
- D. Install piping free of sags and bends.
- E. Install fittings for changes in direction and branch connections.
- F. Install piping to allow application of insulation.
- G. Select system components with pressure rating equal to or greater than system operating pressure.
- H. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- I. Install piping at a uniform grade of 0.2 percent upward in direction of flow.
- J. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
- K. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.
- L. Install valves according to the applicable Division 23 Sections.
- M. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
- N. Comply with requirements in applicable Division 23 Sections for identifying piping.

## **3.2 HANGERS AND SUPPORTS**

- A. Comply with requirements applicable Division 23 Sections for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.
- B. Install the following pipe attachments:
  - 1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
  - 2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.
  - 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
  - 4. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- C. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
  - 1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
  - 2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
  - 3. NPS 1-1/4Maximum span, 7 feet; minimum rod size, 3/8 inch.
  - 4. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
  - 5. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
- D. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.

# 3.3 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Pressure-Sealed Joints: Use manufacturer-recommended tool and procedure. Leave insertion marks on pipe after assembly.

## 3.4 TERMINAL EQUIPMENT CONNECTIONS

- A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.
- B. Install control valves in accessible locations close to connected equipment.
- C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.
- D. Install ports for pressure gages and thermometers at coil inlet and outlet connections. Comply with requirements in applicable Division 23 Sections.

## 3.5 FIELD QUALITY CONTROL

- A. Prepare hydronic piping according to ASME B31.9 and as follows:
  - 1. Leave joints, including welds, uninsulated and exposed for examination during test.
  - 2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
  - 3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
  - 4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
  - 5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
- B. Perform the following tests on hydronic piping:
  - 1. Comply with current International Mechanical Code for test procedures and pressure (for reference, IMC 2015, Section 1208).
  - 2. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
  - 3. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
  - 4. Isolate expansion tanks and determine that hydronic system is full of water.
  - 5. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."

- 6. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
- 7. Prepare written report of testing.
- C. Perform the following before operating the system:
  - 1. Open manual valves fully.
  - 2. Inspect pumps for proper rotation.
  - 3. Set makeup pressure-reducing valves for required system pressure.
  - 4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
  - 5. Set temperature controls so all coils are calling for full flow.
  - 6. Verify lubrication of motors and bearings.

## 3.6 ADJUSTING AND CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.
- B. Flush hydronic piping systems with clean water. Remove, clean, and replace strainer screens. After cleaning and flushing hydronic piping system, but before balancing, remove disposable fine-mesh strainers in pump suction diffusers.

## 3.7 START-UP

- A. Fill system and perform initial chemical treatment.
- B. Check expansion tanks to determine that they are not air bound and that system is completely full of water.
- C. Perform these steps before operating the system:
  - 1. Open valves to fully open position.
  - 2. Check pump for proper direction of rotation.
  - 3. Set automatic fill valves for required system pressure.
  - 4. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or bleed air completely (manual type).
  - 5. Set temperature controls so all coils are calling for full flow.
  - 6. Check operation of automatic bypass valves.
  - 7. Check and set operating temperatures of boilers, heat exchangers, and environmental control air conditioning units to design requirements.
  - 8. Lubricate motors and bearings.

## END OF SECTION 232113

# **SECTION 232116 - HYDRONIC PIPING SPECIALTIES**

### 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 ACTION SUBMITTALS

- A. Product Data: For each type of product:
  - 1. Include construction details and material descriptions for hydronic piping specialties.
  - 2. Include rated capacities, operating characteristics, and furnished specialties and accessories.
  - 3. Include flow and pressure drop curves based on manufacturer's testing for calibratedorifice balancing valves and automatic flow-control valves.

## 1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For hydronic piping specialties to include in emergency, operation, and maintenance manuals.

#### PART 2 - PRODUCTS

#### 2.1 HYDRONIC SPECIALTY VALVES

- A. Bronze, Calibrated-Orifice, Balancing Valves:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Bell & Gossett; a Xylem brand or a comparable product by one of the following:
    - a. NIBCO INC.
    - b. TACO Comfort Solutions, Inc.
    - c. Victaulic Company.
    - d. Or approved equal.
  - 2. Body: Bronze, ball or plug type with calibrated orifice or venturi.
  - 3. Ball: Brass or stainless steel.
  - 4. Plug: Resin.
  - 5. Seat: PTFE.
  - 6. End Connections: Threaded or socket.

- 7. Pressure Gage Connections: Integral seals for portable differential pressure meter.
- 8. Handle Style: Lever, with memory stop to retain set position.
- 9. CWP Rating: Minimum 125 psig.
- 10. Maximum Operating Temperature: 250 deg F.

## 2.2 AIR-CONTROL DEVICES

- A. Manual Air Vents:
  - 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. AMTROL, Inc.
    - b. Armstrong Pumps, Inc.
    - c. Bell & Gossett; a Xylem brand.
    - d. TACO Comfort Solutions, Inc.
    - e. Or approved equal.
  - 2. Body: Bronze.
  - 3. Internal Parts: Nonferrous.
  - 4. Operator: Screwdriver or thumbscrew.
  - 5. Inlet Connection: NPS 1/2.
  - 6. Discharge Connection: NPS 1/8.
  - 7. CWP Rating: 150 psig.
  - 8. Maximum Operating Temperature: 225 deg F.

#### PART 3 - EXECUTION

#### 3.1 VALVE APPLICATIONS

- A. Install shutoff-duty valves at each branch connection to supply mains and at supply connection to each piece of equipment.
- B. Install calibrated-orifice, balancing valves as indicated.

### 3.2 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual vents at heat-transfer coils and elsewhere as required for air venting.

## END OF SECTION 232116

# **SECTION 233113 - DUCTWORK**

### 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. Rectangular and round ductwork for heating, ventilation, and air-conditioning systems.
  - 2. Duct liner.
  - 3. Sealants and gaskets.
  - 4. Duct hangers and supports.
- B. Construction Requirements:
  - 1. Sound Sensitive Locations Spaces with an NC rating less than or equal to 20 (i.e. Classrooms, Stages, etc.):
  - 2. Indicated duct sizes shown on drawings are clear internal dimensions.
  - 3. Systems associated with the various unit ventilators to be spiral lock galvanized steel, painted, field or factory, with color selected by Architect.
  - 4. Construct all ductwork to achieve a Seal Class A per SMACNA Construction Standards.

### 1.3 DEFINITIONS

- A. Thermal Conductivity and Apparent Thermal Conductivity (k-Value): As defined in ASTM C 168. In this Section, these values are the result of the formula Btu x in./h x sq. ft. x deg F or W/m x K at the temperature differences specified. Values are expressed as Btu or W.
  - 1. Example: Apparent Thermal Conductivity (k-Value): 0.26 or 0.037

#### **1.4 PERFORMANCE REQUIREMENTS**

A. Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

- B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

## 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of the following products:
  - 1. Liners and adhesives.
  - 2. Sealants and gaskets.
  - 3. Duct-Design Submittal:
    - a. Sheet metal thicknesses.
    - b. Joint and seam construction and sealing.
    - c. Reinforcement details and spacing.
    - d. Materials, fabrication, assembly, and spacing of hangers and supports.
- B. Shop Drawings:
  - 1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
  - 2. Factory- and shop-fabricated ducts and fittings.
  - 3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
  - 4. Elevation of top of ducts.
  - 5. Dimensions of main duct runs from building grid lines.
  - 6. Fittings.
  - 7. Reinforcement and spacing.
  - 8. Seam and joint construction.
  - 9. Penetrations through fire-rated and other partitions.
  - 10. Equipment installation based on equipment being used on Project.
  - 11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
  - 12. Hangers and supports, including methods for duct and building attachment and vibration isolation.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services (piping, conduits, etc.). Indicate proposed changes to duct layout.
  - 2. Suspended ceiling components.

- 3. Structural members to which duct will be attached.
- 4. Size and location of initial access modules for acoustical tile.
- 5. Penetrations of smoke barriers and fire-rated construction.
- 6. Items penetrating finished ceiling including the following:
  - a. Luminaires.
  - b. Air outlets and inlets.
  - c. Speakers.
  - d. Sprinklers.
  - e. Access panels.
  - f. Perimeter moldings.
- B. Welding certificates.
- C. Field quality-control reports.
- D. Record Drawings (As-Built): Indicate actual routing, fitting details, reinforcement, support, and installed accessories and devices.

## 1.7 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel," for hangers and supports.
  - 2. AWS D1.2/D1.2M, "Structural Welding Code Aluminum," for aluminum supports.
  - 3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," unless otherwise indicated.
- C. Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.
- D. SMACNA: Gages of materials, fabrication, reinforcement, sealing requirements, installation, and method of supporting ductwork shall be in accordance with the following SMACNA manuals, unless otherwise shown or specified:
  - 1. HVAC Duct Construction Standards.
  - 2. Round Industrial Duct Construction Standard.
  - 3. Rectangular Industrial Duct Construction Standard.

## 1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver sealant and firestopping materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

- B. Store and handle sealant and firestopping materials according to manufacturer's written recommendations.
- C. Deliver and store stainless-steel sheets with mill-applied adhesive protective paper maintained through fabrication and installation.
- D. Duct is to be delivered to the construction site either fully wrapped in plastic or openings are capped with thick plastic to prevent construction debris entering inside duct.
- E. Deliver, store, and protect ductwork from weather damage and physical damage. Provide temporary plastic end caps on open duct ends as work is performed in stages and install as the end of the days' work is completed. Remove the temporary caps as the work progresses.

### PART 2 - PRODUCTS

## 2.1 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
  - 1. Galvanized Coating Designation: G90.
  - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- D. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
  - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

# 2.2 SEALANT AND GASKETS

A. Indoor Ductwork Sealant: UL Classified and Listed, NFPA 90A and 90B compliant, 0 flame spread/smoke developed ratings, water based, non-flammable, acrylic copolymer with 70% ± 2% solids content, 24 to 72 hour cure time, for use up to 15-inch wg and SMACNA Class A seals. Design Polymerics "DP 1010" or equal.

- B. Flanged Joint Sealant: Comply with ASTM C 920.
  - 1. General: Single-component, acid-curing, silicone, elastomeric.
  - 2. Type: S.
  - 3. Grade: NS.
  - 4. Class: 25.
  - 5. Use: O.
- C. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

## 2.3 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- C. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36.
  - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

### 2.4 STATIC PRESSURE CLASSIFICATIONS

- A. Static-Pressure Classifications for Ductwork Construction:
  - 1. Supply ductwork (except as noted otherwise): Pressure classification per the equipment scheduled discharge static pressure; positive pressure (rated for a minimum 2-inches water column).

#### 2.5 DUCT LINER

- A. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A or NFPA 90B.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Armacell LLC; or a comparable product by one of the following:
    - a. Aeroflex USA, Inc.
    - b. K-Flex USA.
    - c. Rubatex International, LLC.
    - d. Or approved equal.
  - 2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
  - 3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

- B. Insulation Pins and Washers:
  - 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
  - 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."
  - 1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
  - 2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
  - 3. Butt transverse joints without gaps, and coat joint with adhesive.
  - 4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure buttededge overlapping.
  - 5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
  - 6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.
  - 7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
  - 8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
    - a. Fan discharges.
    - b. Intervals of lined duct preceding unlined duct.
    - c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.
  - 9. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

## 2.6 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

### PART 3 - EXECUTION

### 3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible" unless otherwise indicated.
- C. Install ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated interior partitions and exterior walls, if applicable, install fire dampers. Comply with requirements in the applicable Division 23 Sections.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.
- M. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless specifically indicated.
- N. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

## 3.2 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

#### 3.3 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: To suit existing construction.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

### 3.4 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with applicable Division 23 Sections
- B. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

## 3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Duct System Cleanliness Tests:
  - 1. Visually inspect duct system to ensure that no visible contaminants are present.
  - 2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
    - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.
- C. Duct system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

#### 3.6 START UP

A. Air Balance: Comply with requirements in applicable Division 23 Sections.

# END OF SECTION 233113

# SECTION 233300 - DUCT ACCESSORIES

### 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. Manual volume dampers.
  - 2. Turning vanes.
  - 3. Flexible connectors.
  - 4. Duct accessory hardware.

#### 1.3 ACTION SUBMITTALS

- A. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
  - 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
    - a. Special fittings.
    - b. Manual volume damper installations.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.
- B. Source quality-control reports.

#### 1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

#### PART 2 - PRODUCTS

#### 2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

#### 2.2 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
  - 1. Galvanized Coating Designation: G90.
  - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

#### 2.3 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:
  - 1. Standard leakage rating, with linkage outside airstream.
  - 2. Suitable for horizontal or vertical applications.
  - 3. Frames:
    - a. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel.
    - b. Mitered and welded corners.
    - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
  - 4. Blades:
    - a. Multiple or single blade.
    - b. Parallel- or opposed-blade design.
    - c. Stiffen damper blades for stability.
    - d. Galvanized-steel, 0.064 inch thick.
  - 5. Blade Axles: Galvanized steel.
  - 6. Bearings:
    - a. Oil-impregnated bronze.

- b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
- 7. Tie Bars and Brackets: Galvanized steel.
- B. Jackshaft:
  - 1. Size: 0.5-inch diameter.
  - 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
  - 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
- C. Damper Hardware:
  - 1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
  - 2. Include center hole to suit damper operating-rod size.
  - 3. Include elevated platform for insulated duct mounting.

## 2.4 TURNING VANES

- A. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
  - 1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- B. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."
- D. Vane Construction: Single wall.

## 2.5 FLEXIBLE CONNECTORS

- A. Materials: Flame-retardant or noncombustible fabrics.
- B. Coatings and Adhesives: Comply with UL 181, Class 1.
- C. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.
- D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

- 1. Minimum Weight: 26 oz./sq. yd..
- 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
- 3. Service Temperature: Minus 40 to plus 200 deg F.

### 2.6 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for metal ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Compliance with ASHRAE/IESNA 90.1-2004 includes Section 6.4.3.3.3 "Shutoff Damper Controls," restricts the use of backdraft dampers, and requires control dampers for certain applications. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
  - 1. Install steel volume dampers in steel ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
  - 1. On both sides of duct coils.
  - 2. Upstream from duct filters.
  - 3. At outdoor-air intakes and mixed-air plenums.
  - 4. At drain pans and seals.

- 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
- 6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
- 7. At each change in direction and at maximum 50-foot spacing.
- 8. Upstream from turning vanes.
- 9. Control devices requiring inspection.
- 10. Elsewhere as indicated.
- H. Install access doors with swing against duct static pressure.
- I. Label access doors according to applicable Division 23 Sections to indicate the purpose of access door.
- J. Install flexible connectors to connect ducts to equipment.
- K. Connect flexible ducts to metal ducts with draw bands.
- L. Install duct test holes where required for testing and balancing purposes.

## 3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
  - 1. Operate dampers to verify full range of movement.
  - 2. Inspect locations of access doors and verify that purpose of access door can be performed.
  - 3. Operate dampers to verify full range of movement.
  - 4. Inspect turning vanes for proper and secure installation.
  - 5. Operate remote damper operators to verify full range of movement of operator and damper.

## 3.3 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Final positioning of manual-volume dampers is specified in applicable Division 23 Section.

## END OF SECTION 233300

### SECTION 233423 - POWER VENTILATORS

### 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 PERFORMANCE REQUIREMENTS**

- A. Project Altitude: Base fan-performance ratings on sea level.
- B. Operating Limits: Classify according to AMCA 99.
- C. Fan Unit Schedule: The following information is described in an equipment schedule on the Drawings.
  - 1. Fan performance data including capacities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:
  - 1. Indicated facility where fan is being installed.
  - 2. Certified fan performance curves with system operating conditions indicated.
  - 3. Certified fan sound-power ratings.
  - 4. Motor ratings and electrical characteristics, plus motor and electrical accessories.
  - 5. Material thickness and finishes, including color charts.
  - 6. Dampers, including housings, linkages, and operators.
  - 7. Roof curbs.
  - 8. Fan speed controllers.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 2. Wiring Diagrams: For power, signal, and control wiring clearly differentiating between manufacturer-installed and field-installed wiring.

## 1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

### 1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

### 1.6 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.
- B. Listing and Labeling: Provide electrically operated fixtures 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.
- C. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.
- D. UL Standards: Power ventilators shall comply with UL 705.
- E. NEMA Compliance: Provide components required as part of fans that comply with applicable NEMA standards.

## 1.7 **PROJECT CONDITIONS**

A. Field Measurements: Verify dimensions by field measurements. Verify clearances.

#### PART 2 - PRODUCTS

### 2.1 ROOFTOP CENTRIFUGAL FANS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or by one of the following:
  - 1. Greenheck Fan Corporation.
  - 2. PennBarry.
  - 3. Or approved equal.
- B. Housing: Injection molded.

- C. Fan Wheels: forward curved, injection molded.
- D. Accessories:
  - 1. Variable-Speed Controller: Provide manufacturer's unit mounted solid state speed controller for direct drive fans.
  - 2. Intake grille.
  - 3. Disconnect Switch: Nonfusible type.
  - 4. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
  - 5. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
- E. Curbs: 12-inches high with wood nailer.

### 2.2 SOURCE QUALITY CONTROL

- A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

#### 2.3 OPERATION

A. Contractor to provide all necessary controls, wiring, wiring conduits, manufacturer's recommended equipment and installation options, and system appurtenances to facilitate the intended use and satisfy the requirements for a fully operational system.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements of installation tolerances and other conditions affecting performance of the power ventilators. Do not proceed with installation until unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Install power ventilators level and plumb.
- B. Support units utilizing the vibration-control devices indicated.
- C. Install units with clearances for service and maintenance.

D. Label units according to requirements specified in applicable Division 23 Section.

### 3.3 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment according to applicable Division 26 Section.
- D. Connect wiring according to applicable Division 26 Section.

### 3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
  - 1. Verify that shipping, blocking, and bracing are removed.
  - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
  - 3. Verify that cleaning and adjusting are complete.
  - 4. Adjust damper linkages for proper damper operation.
  - 5. Verify lubrication for bearings and other moving parts.
  - 6. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
  - 7. Shut unit down and reconnect automatic temperature-control operators.
  - 8. Remove and replace malfunctioning units and retest as specified above.
- C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Prepare test and inspection reports on findings and recommended corrective actions.

### 3.5 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Comply with requirements in applicable Division 23 for testing, adjusting, and balancing procedures.

C. Lubricate bearings.

## 3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fans as specified below:
  - 1. Train maintenance personnel for 1 hour minimum on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining fans.
  - 2. Review data in maintenance manuals.
  - 3. Schedule training with at least seven days' advance notice.

## END OF SECTION 233423

# SECTION 233713 - AIR DIFFUSERS, REGISTERS, & GRILLES

## 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 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Data Sheet: For each type of air outlet and inlet and accessory furnished; indicate materials of construction, finish, and mounting details
  - 2. Performance data including throw and drop, static-pressure drop, and noise ratings.
    - a. Provide breakouts by neck size and indicate associated airflow ranges. Indicate minimum and maximum throw & drop data, static-pressure drop, and noise ratings for each indicated neck size and airflow range (min/max).
    - b. Manufacturer's standard performance data sheets are NOT ACCEPTABLE.
  - 3. Schedule of diffusers and registers: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.
  - 4. Assembly Drawings: For each type of air outlet and inlet; indicate materials and methods of assembly of components.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for diffusers, registers, and grilles with factory-applied color finishes.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Ceiling suspension assembly members.
  - 2. Method of attaching hangers to building structure.
  - 3. Size and location of initial access modules for acoustical tile.
  - 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
  - 5. Duct access panels.
B. Source quality-control reports.

### 1.4 QUALITY ASSURANCE

- A. Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 01.
- B. NFPA Compliance: Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems."
- C. Single Source Responsibility: Diffusers, registers, and grilles of the Type identified shall be provided from manufacturer.

### PART 2 - PRODUCTS

### 2.1 MANUFACTURED UNITS

- A. Manufacturers.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Titus model indicated, or comparable product by one of the following:
    - a. Tuttle & Bailey.
    - b. Price.
    - c. Titus
    - d. Or approved equal.
- B. Diffusers, registers, and grilles.
  - 1. Type 'A' Diffusers: TDV ("Titus" model TDV) description in construction documents shall indicate size and air flow pattern.
  - 2. Type 'B' Return and Exhaust Grilles/Registers: 350 L ("Titus" 350 series) description in construction documents shall indicate size and damper type. documents shall indicate size and air flow pattern.
  - 3. Type 'C' Supply Registers: 300 RL (Titus" 300 series with individually adjustable blades).

### 2.2 PRODUCT

- A. TDV Type 'A':
  - 1. Ceiling Diffusers: The ceiling diffusers shall be multi-orificed jet induction and air mixing type consisting of louver sections with built-in diffusing vanes.
  - 2. The vanes shall be arranged to discharge air from adjacent louvers at an angle of 45 F in opposite directions to ensure rapid mixing of primary and room air. Diffusing vanes

shall be welded and mechanically fastened to the adjacent louver sections to make a rigid unit. The vanes shall extend to the discharge edges of the louvers. Where louver sections join the core frame, the louver ends shall be welded to the core frame.

- 3. The leaving edge of each louver shall be hemmed and the louver ends shall be rounded and hemmed before welding to the core frames.
- 4. Diffusers shall be provided with a removable core permitting easy access to the collar connection. The diffuser shall extend no less than 1" above the core to accommodate an internal duct connection to prevent leakage into the ceiling space.
- 5. Finish shall be anodic acrylic paint, baked.
- B. 350 L Type 'B':
  - 1. Return grilles and registers have fixed horizontal bars spaced 3/4 inch centers with 35 deg face deflection, unless otherwise noted, blades parallel to the long dimension.
  - 2. Overlap margin 1 1/4 inch nominal width. Furnished with countersunk screw holes and mounting screws, or tee bar lay in panel.
  - 3. Construction rigid heavy-gauge margins with reinforced mitered corners.
  - 4. Roll-formed bars streamlined shaped rigid steel bars on 3/4 inch centers, deflected. Bars driven on swaged pins are firmly held by mullions welded behind grille face.
  - 5. Integral dampers double thickness roll-formed steel blades. Opposed blade damper designed for key or screwdriver operation.
  - 6. Finish shall be anodic acrylic paint, baked.
- C. Aluminum construction in toilet rooms, steel construction in all other areas.
- D. Provide opposed blade dampers on air devices.
- E. Noise level not to exceed effective total noise of 25 NC for classrooms (based on air device quantities), otherwise not to exceed 35 NC, or as noted.
- F. Finish to be baked enamel (unless otherwise noted), color to be approved by Architect. Provide color chart.
- G. Static pressure not to exceed as scheduled or 0.1-inches w.c. except where indicated on schedule.
- H. Confirm required mounting frames with field conditions and Architectural Drawings.

### 2.3 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

#### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Examine areas where diffusers are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Install diffusers level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Professional for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

#### 3.3 ADJUSTING

A. After installation, adjust diffusers to air patterns indicated, or as directed, before starting air balancing.

#### 3.4 CLEANING

A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION 233713

#### SECTION 237343 – INTERIOR AIR-HANDLING UNITS

#### 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 indoor, air-handling units that are factory assembled.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data: For each air-handling unit.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
  - 3. Include unit dimensions and weight.
  - 4. Include cabinet material, metal thickness, finishes, insulation, and accessories.
  - 5. Fans:
    - a. Include certified fan-performance curves with system operating conditions indicated.
    - b. Include certified fan-sound power ratings.
    - c. Include fan construction and accessories.
    - d. Include motor ratings, electrical characteristics, and motor accessories.
  - 6. Include certified coil-performance ratings with system operating conditions indicated.
  - 7. Include filters with performance characteristics.
  - 8. Include dampers, including housings, linkages, and operators.
- B. Shop Drawings: For each type and configuration of indoor, air handling unit.
  - 1. Include plans, elevations, sections, and mounting details.
  - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Detail fabrication and assembly of indoor, semi-custom air-handling units, as well as procedures and diagrams.
  - 4. Include diagrams for power, signal, and control wiring.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans and other details, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.
- B. Source quality-control reports.
- C. Startup service reports.
- D. Field quality-control reports.
- E. Sample Warranty: For manufacturer's warranty.

### 1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air-handling units to include in emergency, operation, and maintenance manuals.

### 1.6 WARRANTY

A. Manufacturer shall provide a limited "parts only" warranty for a period of 12 months from the date of equipment start up or 18 months from the date of original equipment shipment from the factory, whichever is less. Warranty shall cover material and workmanship that prove defective, within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed. Warranty excludes parts associated with routine maintenance, such as belts and air filters.

### 1.7 SOURCE QUALITY CONTROL

- A. Unit shall be certified in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment.
- B. Unit shall be safety certified by ETL and ETL US listed. Unit nameplate shall include the ETL/ETL Canada label.
- C. Air-handling units and their components shall be factory tested according to AHRI 430 and shall be listed and labeled by AHRI.
- D. AMCA 301 or AHRI 260: Air-handling unit fan sound ratings shall comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data," or AHRI 260, "Sound Rating of Ducted Air Moving and Conditioning Equipment."
- E. Water Coils: Factory tested to 300 psig according to AHRI 410 and ASHRAE 33.

### 1.8 DELIVERY, STORAGE, AND HANDLING

A. Unit shall be wrapped in plastic prior to shipment to prevent damage during transport and thereafter while in storage awaiting installation.

- B. Follow Installation, Operation and Maintenance manual instructions for rigging, moving, and unloading the unit at its final location.
- C. Unit shall be handled carefully to avoid damage to components, enclosures and finish.
- D. Unit shall be stored in a clean, dry place protected from construction traffic in accordance with the Installation, Operation and Maintenance manual.

#### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- 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.
- B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of airhandling units and components.
- C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 "Systems and Equipment" and Section 7 "Construction and Startup."
- D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 "Heating, Ventilating, and Air-Conditioning."
- E. Structural Performance: Casing panels shall be self-supporting and capable of withstanding positive/negative 8-inch wg of internal static pressure, without exceeding a midpoint deflection of 0.0042 inch/inch of panel span.
- F. Casing Leakage Performance: ASHRAE 111, Class 6 leakage or better at plus or minus 8 inch wg.

#### 2.2 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - 1. Trane.
  - 2. York.

### 2.3 GENERAL DESCRIPTION

- A. Indoor air handling unit shall include filters, supply fan, chilled water coil, hot water heating coil, mixing box, and unit controls.
- B. Unit shall have a draw-through supply fan configuration and discharge air horizontally.
- C. Unit shall be factory assembled and tested including leak testing of the hydronic coils, and run testing of the supply fans and factory wired electrical system. Run test report shall be supplied with the unit.

- D. Unit shall have decals and tags to indicate lifting and rigging, service areas and caution areas for safety and to assist service personnel.
- E. Unit components shall be labeled, including pipe stub outs, and electrical and controls components.
- F. Installation, Operation and Maintenance manual shall be supplied within the unit.
- G. Laminated color-coded wiring diagram shall match factory installed wiring and shall be affixed to the interior of the control compartment's hinged access door.
- H. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment's hinged access door.

### 2.4 UNIT CONSTRUCTION

- A. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.
- B. Unit insulation shall have a minimum thermal resistance R-value of 6.25. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D1929-11 for a minimum flash ignition temperature of 610°F.
- C. Unit construction shall be double wall with G90 galvanized steel on both sides and a thermal break. Double wall construction with a thermal break prevents moisture accumulation on the insulation, provides a cleanable interior, prevents heat transfer through the panel and prevents exterior condensation on the panel.
- D. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Sealing shall be included between panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.
- E. Access to filters shall be through hinged access door with quarter turn fasteners.
- F. Access to cooling coil shall be through hinged access door with lockable quarter turn handles.
- G. Access to heating coil shall be through hinged access door with lockable quarter turn handles.
- H. Access to external control panel shall be through hinged access door with tooled entry.
- I. Access to supply fan shall be through an access door with removable pin hinges and lockable quarter turn handles.
- J. Access doors shall be flush mounted to cabinetry.
- K. Units with a cooling coil shall include sloped 304 stainless steel drain pan with a 1" MPT fitting connection.
- L. Cooling coil shall be mechanically supported above the drain pan by multiple supports that allow drain pan cleaning and coil removal.

M. Unit shall include factory wired control panel compartment LED service lights.

### 2.5 ELECTRICAL

- A. Unit shall be provided with an external control panel with separate low voltage control wiring with conduit and high voltage power wiring with conduit between the control panel and the unit. Control panel shall be field mounted.
- B. Unit shall be provided with standard power block for connecting power to the unit.
- C. Unit shall include a factory installed 24V control circuit transformer.
- D. Unit shall be provided with phase and brown out protection which shuts down all motors in the unit if the electrical phases are more than 10% out of balance on voltage, the voltage is more than 10% under design voltage or on phase reversal.

### 2.6 SUPPLY FANS

- A. Unit shall include direct drive, unhoused, backward curved, plenum supply fans.
- B. Blower and motor assembly shall be dynamically balanced.
- C. Motor shall be a high efficiency electronically commutated motor (ECM).
- D. Blower and motor assembly shall be mounted on rubber isolators.
- E. ECM driven supply fan CFM setpoint shall be set with factory installed controller.

### 2.7 COOLING COIL

- A. Comply with AHRI 410.
- B. Coil shall be certified in accordance with AHRI Standard 410 and be hydrogen or helium leak tested.
- C. Coil shall be designed and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and aluminum end casings. Fin design shall be sine wave rippled.
- D. Coil shall have external piping connections. Supply and return connections shall be sweat connection. Coil connections shall be labeled, extend beyond the unit casing, and be factory sealed on both the interior and exterior of the unit casing to minimize air leakage.

### 2.8 HEATING COIL

- A. Comply with AHRI 410.
- B. Coil shall be certified in accordance with AHRI Standard 410 and be hydrogen or helium leak tested.

- C. Coil shall be designed and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and aluminum end casings. Fin design shall be sine wave rippled.
- D. Coil shall have external piping connections. Supply and return connections shall be sweat connection. Coil connections shall be labeled, extend beyond the unit casing, and be factory sealed on both the interior and exterior of the unit casing to minimize air leakage.

#### 2.9 FILTERS

A. Unit shall include 4 inch thick, pleated panel filters with an MERV rating of 8, upstream of the cooling coil.

#### 2.10 MIXING BOX

A. Manufacturer's standard mixing box.

#### 2.11 CONTROLS

A. Comply with Division 23 DDC System Specifications.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine casing insulation materials and filter media before air-handling unit installation. Reject insulation materials and filter media that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for hydronic and condensate drainage piping systems and electrical services to verify actual locations of connections before installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Equipment Mounting:
  - 1. Mount on roof. Provide roof curb and vibrations isolation rail.
- B. Arrange installation to provide access space around air-handling unit for service and maintenance.
- C. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with new, clean filters.
- D. Connect duct to air-handling units with flexible connections.

#### 3.3 **PIPING CONNECTIONS**

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to air-handling unit, allow for service and maintenance.
- C. Connect condensate drain pans using, ASTM B88, Type DWV copper tubing.

### 3.4 ELECTRICAL CONNECTIONS

- A. Connect wiring according to applicable Division 26 Sections.
- B. Ground equipment according to applicable Division 26 Sections.
- C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.
- D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
  - 1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in applicable Division 26 Sections.

#### 3.5 CONTROL CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.
- B. Connect control wiring according to applicable Division 23 and Division 26 Sections.

# 3.6 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
  - 1. Complete installation and startup checks according to manufacturer's written instructions.
  - 2. Verify that shipping, blocking, and bracing are removed.
  - 3. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, controllers, and switches.
  - 4. Verify proper motor rotation direction, free fan wheel rotation, and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
  - 5. Verify that bearings, pulleys, belts, and other moving parts are lubricated with factory-recommended lubricants.
  - 6. Verify that outdoor- and return-air mixing dampers open and close, and maintain minimum outdoor-air setting.
  - 7. Comb coil fins for parallel orientation.
  - 8. Install new, clean filters.

- 9. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.
- B. Starting procedures for air-handling units include the following:
  - 1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm.
  - 2. Measure and record motor electrical values for voltage and amperage.
  - 3. Manually operate dampers from fully closed to fully open position and record fan performance.

### 3.7 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for air-handling system testing, adjusting, and balancing.
- C. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

#### 3.8 CLEANING

A. After completing system installation and testing, adjusting, and balancing air-handling unit and air-distribution systems and after completing startup service, clean air-handling units internally to remove foreign material and construction dirt and dust. Clean fan wheels, cabinets, dampers, coils, and filter housings, and install new, clean filters.

#### 3.9 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
  - 1. Leak Test: After installation, fill hydronic coils with water, and test coils and connections for leaks.
  - 2. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Air-handling unit or components will be considered defective if unit or components do not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.10 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air-handling units.
  - 1. Train maintenance personnel for 4 hours minimum on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining unit.
  - 2. Review data in maintenance manuals.
  - 3. Schedule training with at least seven days' advance notice.

# END OF SECTION 237343

#### SECTION 237344 – EXTERIOR AIR-HANDLING UNITS

#### 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 indoor, air-handling units that are factory assembled.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each air-handling unit.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
  - 3. Include unit dimensions and weight.
  - 4. Include cabinet material, metal thickness, finishes, insulation, and accessories.
  - 5. Fans:
    - a. Include certified fan-performance curves with system operating conditions indicated.
    - b. Include certified fan-sound power ratings.
    - c. Include fan construction and accessories.
    - d. Include motor ratings, electrical characteristics, and motor accessories.
  - 6. Include certified coil-performance ratings with system operating conditions indicated.
  - 7. Include filters with performance characteristics.
  - 8. Include dampers, including housings, linkages, and operators.
- B. Shop Drawings: For each type and configuration of indoor, air handling unit.
  - 1. Include plans, elevations, sections, and mounting details.
  - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Detail fabrication and assembly of indoor, semi-custom air-handling units, as well as procedures and diagrams.
  - 4. Include diagrams for power, signal, and control wiring.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans and other details, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.
- B. Source quality-control reports.
- C. Startup service reports.
- D. Field quality-control reports.
- E. Sample Warranty: For manufacturer's warranty.

### 1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air-handling units to include in emergency, operation, and maintenance manuals.

### 1.6 WARRANTY

A. Manufacturer shall provide a limited "parts only" warranty for a period of 12 months from the date of equipment start up or 18 months from the date of original equipment shipment from the factory, whichever is less. Warranty shall cover material and workmanship that prove defective, within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed. Warranty excludes parts associated with routine maintenance, such as belts and air filters.

### 1.7 SOURCE QUALITY CONTROL

- A. Unit shall be certified in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment.
- B. Unit shall be safety certified by ETL and ETL US listed. Unit nameplate shall include the ETL/ETL Canada label.
- C. Air-handling units and their components shall be factory tested according to AHRI 430 and shall be listed and labeled by AHRI.
- D. AMCA 301 or AHRI 260: Air-handling unit fan sound ratings shall comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data," or AHRI 260, "Sound Rating of Ducted Air Moving and Conditioning Equipment."
- E. Water Coils: Factory tested to 300 psig according to AHRI 410 and ASHRAE 33.

### 1.8 DELIVERY, STORAGE, AND HANDLING

A. Unit shall be wrapped in plastic prior to shipment to prevent damage during transport and thereafter while in storage awaiting installation.

- B. Follow Installation, Operation and Maintenance manual instructions for rigging, moving, and unloading the unit at its final location.
- C. Unit shall be handled carefully to avoid damage to components, enclosures and finish.
- D. Unit shall be stored in a clean, dry place protected from construction traffic in accordance with the Installation, Operation and Maintenance manual.

#### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- 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.
- B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of airhandling units and components.
- C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 "Systems and Equipment" and Section 7 "Construction and Startup."
- D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 "Heating, Ventilating, and Air-Conditioning."
- E. Structural Performance: Casing panels shall be self-supporting and capable of withstanding positive/negative 8-inch wg of internal static pressure, without exceeding a midpoint deflection of 0.0042 inch/inch of panel span.
- F. Casing Leakage Performance: ASHRAE 111, Class 6 leakage or better at plus or minus 8 inch wg.

#### 2.2 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - 1. Trane.
  - 2. York.

### 2.3 GENERAL DESCRIPTION

- A. Indoor air handling unit shall include filters, supply fan, chilled water coil, hot water heating coil, mixing box, and unit controls.
- B. Unit shall have a draw-through supply fan configuration and discharge air horizontally.
- C. Unit shall be factory assembled and tested including leak testing of the hydronic coils, and run testing of the supply fans and factory wired electrical system. Run test report shall be supplied with the unit.

- D. Unit shall have decals and tags to indicate lifting and rigging, service areas and caution areas for safety and to assist service personnel.
- E. Unit components shall be labeled, including pipe stub outs, and electrical and controls components.
- F. Installation, Operation and Maintenance manual shall be supplied within the unit.
- G. Laminated color-coded wiring diagram shall match factory installed wiring and shall be affixed to the interior of the control compartment's hinged access door.
- H. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment's hinged access door.

### 2.4 UNIT CONSTRUCTION

- A. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.
- B. Unit insulation shall have a minimum thermal resistance R-value of 6.25. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D1929-11 for a minimum flash ignition temperature of 610°F.
- C. Unit construction shall be double wall with G90 galvanized steel on both sides and a thermal break. Double wall construction with a thermal break prevents moisture accumulation on the insulation, provides a cleanable interior, prevents heat transfer through the panel and prevents exterior condensation on the panel.
- D. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Sealing shall be included between panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.
- E. Access to filters shall be through hinged access door with quarter turn fasteners.
- F. Access to cooling coil shall be through hinged access door with lockable quarter turn handles.
- G. Access to heating coil shall be through hinged access door with lockable quarter turn handles.
- H. Access to external control panel shall be through hinged access door with tooled entry.
- I. Access to supply fan shall be through an access door with removable pin hinges and lockable quarter turn handles.
- J. Access doors shall be flush mounted to cabinetry.
- K. Units with a cooling coil shall include sloped 304 stainless steel drain pan with a 1" MPT fitting connection.
- L. Cooling coil shall be mechanically supported above the drain pan by multiple supports that allow drain pan cleaning and coil removal.

M. Unit shall include factory wired control panel compartment LED service lights.

### 2.5 ELECTRICAL

- A. Unit shall be provided with an external control panel with separate low voltage control wiring with conduit and high voltage power wiring with conduit between the control panel and the unit. Control panel shall be field mounted.
- B. Unit shall be provided with standard power block for connecting power to the unit.
- C. Unit shall include a factory installed 24V control circuit transformer.
- D. Unit shall be provided with phase and brown out protection which shuts down all motors in the unit if the electrical phases are more than 10% out of balance on voltage, the voltage is more than 10% under design voltage or on phase reversal.

### 2.6 SUPPLY FANS

- A. Unit shall include direct drive, unhoused, backward curved, plenum supply fans.
- B. Blower and motor assembly shall be dynamically balanced.
- C. Motor shall be a high efficiency electronically commutated motor (ECM).
- D. Blower and motor assembly shall be mounted on rubber isolators.
- E. ECM driven supply fan CFM setpoint shall be set with factory installed controller.

### 2.7 COOLING COIL

- A. Comply with AHRI 410.
- B. Coil shall be certified in accordance with AHRI Standard 410 and be hydrogen or helium leak tested.
- C. Coil shall be designed and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and aluminum end casings. Fin design shall be sine wave rippled.
- D. Coil shall have external piping connections. Supply and return connections shall be sweat connection. Coil connections shall be labeled, extend beyond the unit casing, and be factory sealed on both the interior and exterior of the unit casing to minimize air leakage.

### 2.8 HEATING COIL

- A. Comply with AHRI 410.
- B. Coil shall be certified in accordance with AHRI Standard 410 and be hydrogen or helium leak tested.

- C. Coil shall be designed and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and aluminum end casings. Fin design shall be sine wave rippled.
- D. Coil shall have external piping connections. Supply and return connections shall be sweat connection. Coil connections shall be labeled, extend beyond the unit casing, and be factory sealed on both the interior and exterior of the unit casing to minimize air leakage.

#### 2.9 FILTERS

A. Unit shall include 4 inch thick, pleated panel filters with an MERV rating of 8, upstream of the cooling coil.

#### 2.10 MIXING BOX

A. Manufacturer's standard mixing box.

#### 2.11 CONTROLS

A. Comply with Division 23 DDC System Specifications.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine casing insulation materials and filter media before air-handling unit installation. Reject insulation materials and filter media that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for hydronic and condensate drainage piping systems and electrical services to verify actual locations of connections before installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Equipment Mounting:
  - 1. Mount on roof. Provide roof curb and vibrations isolation rail.
- B. Arrange installation to provide access space around air-handling unit for service and maintenance.
- C. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with new, clean filters.
- D. Connect duct to air-handling units with flexible connections.

#### 3.3 **PIPING CONNECTIONS**

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to air-handling unit, allow for service and maintenance.
- C. Connect condensate drain pans using, ASTM B88, Type DWV copper tubing.

#### 3.4 ELECTRICAL CONNECTIONS

- A. Connect wiring according to applicable Division 26 Sections.
- B. Ground equipment according to applicable Division 26 Sections.
- C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.
- D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
  - 1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in applicable Division 26 Sections.

#### 3.5 CONTROL CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.
- B. Connect control wiring according to applicable Division 23 and Division 26 Sections.

### 3.6 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
  - 1. Complete installation and startup checks according to manufacturer's written instructions.
  - 2. Verify that shipping, blocking, and bracing are removed.
  - 3. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, controllers, and switches.
  - 4. Verify proper motor rotation direction, free fan wheel rotation, and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
  - 5. Verify that bearings, pulleys, belts, and other moving parts are lubricated with factoryrecommended lubricants.
  - 6. Verify that outdoor- and return-air mixing dampers open and close, and maintain minimum outdoor-air setting.
  - 7. Comb coil fins for parallel orientation.
  - 8. Install new, clean filters.

- 9. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.
- B. Starting procedures for air-handling units include the following:
  - 1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm.
  - 2. Measure and record motor electrical values for voltage and amperage.
  - 3. Manually operate dampers from fully closed to fully open position and record fan performance.

#### 3.7 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for air-handling system testing, adjusting, and balancing.
- C. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

#### 3.8 CLEANING

A. After completing system installation and testing, adjusting, and balancing air-handling unit and air-distribution systems and after completing startup service, clean air-handling units internally to remove foreign material and construction dirt and dust. Clean fan wheels, cabinets, dampers, coils, and filter housings, and install new, clean filters.

#### 3.9 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
  - 1. Leak Test: After installation, fill hydronic coils with water, and test coils and connections for leaks.
  - 2. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Air-handling unit or components will be considered defective if unit or components do not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.10 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air-handling units.
  - 1. Train maintenance personnel for 4 hours minimum on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining unit.
  - 2. Review data in maintenance manuals.
  - 3. Schedule training with at least seven days' advance notice.

# END OF SECTION 237344

### SECTION 238223 - UNIT VENTILATORS

#### 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 unit ventilators with the following elements:
  - 1. Unit mounted chilled-water and hot-water heating coils.
  - 2. Custom filler panel for window sill area and unit sides.
  - 3. Energy recovery enthalpy wheel.
  - 4. Custom-field measured louver.
  - 5. Custom Rear Extension back for outside air ventilation & condenser cooling. Refer to Architectural drawings for additional details.
- B. Balance outside air, return air, supply air and exhaust air quantities at completion of equipment installation. Several units provide disproportional outside air to exhaust air quantities and are required to be field balanced internally to the unit to provide scheduled quantities. Balancing procedures are to be strictly followed in accordance to furnished manufacturer's requirements.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: Include specialties and accessories for each unit type and configuration.
  - 1. Include a schedule indicating drawing designation number, unit type, school name, room location, and room number.
  - 2. Include a separate computer-generated rated capacities operating characteristics, electrical characteristics, and furnished specialties and accessories; shipping, installed, and operating weights; materials, and accessories for each unit ventilator type.
  - 3. Include construction details, material descriptions, dimensions of individual components and profiles, including unit ventilator internal component identification, and finishes for each unit ventilator type.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and details.
  - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

- 3. Detail anchorages and attachments to structure and to supported equipment including methods for duct attachment and vibration isolation.
- 4. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
  - 1. Include color chart indicating color options.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
  - 1. Suspended ceiling components.
  - 2. Structural members to which equipment will be attached.
  - 3. Method of attaching hangers to building structure.
  - 4. Size and location of initial access modules for acoustical tile.
- B. Sample Warranty: For special warranty.

### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For unit ventilators to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified in other Division 01 Sections, include the following:
    - a. Maintenance schedules and repair part lists for motors, coils, integral controls, and filters.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Unit Ventilator Filters: Furnish one spare filter(s) for each filter installed.

### 1.7 QUALITY ASSURANCE

- A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 "Systems and Equipment" and Section 7 "Construction and Startup."
- B. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 "Heating, Ventilating, and Air-Conditioning."
- C. 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.

D. Factory-packaged and -tested units rated according to AHRI 390, ASHRAE 33, and UL 1995.

### 1.8 COORDINATION

- A. Coordinate layout and installation of unit ventilators and suspension system components with other construction that penetrates or is supported by ceilings, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.
- B. Coordinate size and location of wall sleeves for outdoor-air intake and exhaust-air discharge.

### 1.9 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. Standard Unit Warranty: All components: Two years from date of Substantial Completion.

### PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - 1. Marvair.
  - 2. Modine Airedale. (Basis of Design)
  - 3. Or approved equal.

### 2.2 MANUFACTURED UNITS - GENERAL

- A. Description: The unit shall be floor-mounted and vertically oriented to allow the supply air to be ducted through associated ceiling air distribution system. All access and maintenance shall be through the front of the unit.
  - 1. Construct in accordance with UL and CSA standards with a label affixed to the unit listing the product code under which it is registered.
  - 2. Unit performance shall be certified in accordance with AHRI 390.
  - 3. Unit shall be constructed following ISO: 9001 quality control program procedures and be fully assembled, charged, wired, and tested prior to shipment.
- B. The unit shall meet a code-required minimum of SEER 14 per AHRI 210/240.
- C. The unit shall be constructed in accordance with ETL & CSA standards, and a label shall be affixed to the unit listing the product code under which it is registered.

### D. General:

- 1. All classroom unit ventilators will be certified for ventilation at ARI 840.
- E. This is a sound sensitive project:
  - 1. Manufacturer to provide 3rd party independent sound data to confirm 45dbA, or less at a distance of 5 feet from the front of the unit ventilator.
  - 2. The front door shall be an ultra-quiet sound retardant door which is clear of grilles or louvers. Return air shall enter through grilles in the side and base of the door. (Return air through the front of the door is not permissible).
  - 3. The unit is to be designed to allow partial or full blockage of one of the three return grilles for mounting against a wall.
  - 4. A vibration absorbing rubber mat shall be provided with each unit sized to fit exactly underneath the unit cabinet dimensions.

### 2.3 CABINETS

- A. Insulation: Minimum 1-inch-thick, acoustic polyester/polyurethane foam with 2 lb density and attached with adhesive complying with ASTM C 916.
  - 1. Surface-Burning Characteristics: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84 by a qualified testing agency.
  - 2. Insulation to contain no fibrous materials.
  - 3. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- B. Main and Auxiliary Drain Pans: Insulated galvanized steel with plastic liner, formed as required by ASHRAE 62.1. Drain pans shall be removable.
  - 1. A condensate connection stub shall be provided internally at the rear of the unit for connection to the field installed building condensate drain system.
- C. Cabinet Construction: Constructed from aluminized steel with 20 gauge panels, degreased and coated per the Cabinet Finish.
- D. Cabinet Finish: Electrostatically applied baked-on polyester powder paint in manufacturer's standard color as selected by Architect.
- E. Cabinet Interior: Interior right and left hand sides shall employ 20 gauge aluminized steel full double wall construction.
- F. Service and Maintenance Access: All service and maintenance access shall be possible through the front of the unit only.
- G. Return air openings shall be integrated into the cabinet sides of unit with excess face area to allow installation of unit against one adjacent wall if required.
- H. Factory-installed access door on the front of the unit.

- 1. Face of door shall be absent of return air openings to allow for easy cleaning.
- 2. Door shall be fully insulated to provide for superior noise deadening at front of unit.
- 3. Door shall employ heavy duty  $\frac{1}{4}$ " zinc plated steel plunger hinges with a spring-loaded  $\frac{1}{4}$ " zinc plated steel pin to allow for easy removal, if required.
- 4. Door is secured with two (2) key locks.
- 5. Door swing designed to turn into itself allowing side of the unit to be installed directly against a wall in the corner of a room.
- I. <u>Manufacturer's custom filler panels to be provide and installed to fill in gap between vertical</u> classroom unit and exterior window along existing window sill. Contractor to coordinate exact required dimensions prior to purchasing. Filler panels to be of same gauge, color and finish as installed equipment. Contractor to install per manufacturer's instructions to ensure proper fit and proper securing.

### 2.4 COILS

- A. Test and rate unit ventilator coils according to ASHRAE 33.
- B. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 210 deg F. Include manual air vent and drain valve.
  - 1. Pre-piped valve packages from the unit ventilator manufacturer is acceptable, provided the entire assembly, including any noted valves, control valves, etc., is in compliance with configurations indicated on the Drawings and applicable Division 23 Sections.

### 2.5 INDOOR FAN

- A. The condenser and evaporator fans shall be statically and dynamically balanced for quiet operation.
- B. Each fan assembly shall be type as indicated with integral direct drive motor.
- C. The indoor fan assembly: Shall consist of one blower inside teardrop housing assembly engineered specifically for optimal airflow with low noise and minimal power consumption. Blower is powered by electronically commutated motor (ECM). The DC motor features a brushless, permanently lubricated ball bearing construction for maintenance free operation. The ECM motor shall also be fully programmed to compensate for a wide variety of static pressures as well as lack of maintenance (dirty air filters).

#### 2.6 FILTER

- A. Filters: Minimum efficiency reporting value (MERV) according to ASHRAE 52.2 and all addendums.
  - 1. Pleated 100% synthetic media: 2-inch MERV 13.

### 2.7 CONTROL PANEL

- A. Located at the top of the unit behind the front door, microprocessor controls with plug-in card, the control panel shall contain a 24-volt control circuit transformer, terminal strip for connection of ATC controller and all necessary contactors, relays and circuit breakers to provide the necessary control.
- B. Wiring: Individually numbered terminal blocks and wires are to match job-specific wiring diagrams. All electrical wires in the control panel will run in an enclosed trough. All controls and wiring is factory installed in a clean, organized arrangement.
- C. Plug and Socket Wiring: Supply and Exhaust Fan decks, compressor, damper assembly, and energy wheel assembly wiring includes plugs local to the assembly allowing for quick wiring disconnect when the component requires removal for service.
- D. Wiring outside the control panel shall be run in a protective sleeve.

### 2.8 INTEGRAL ENERGY RECOVERY VENTILATION - ENTHALPY WHEEL

- A. Energy recovery ventilation (ERV) provided within the unit through an enthalpy transfer wheel mounted in an insulated cassette frame complete with seals, drive motor, and belt. The rotary wheel is coated with silica gel desiccant and is sized to handle a maximum of 500 cfm of outside air. The entire assembly shall be a UL tested component. Performance shall be certified in accordance with the ASHRAE Standard 84 method of test and AHRI Rating Standard of 1060.
- B. ERV Fans: ERV system employs dual electronically commutated ventilation fans to ensure precise control of airflow through energy wheel and provide optimal wheel frost protection as required.
- C. Outside Air Damper: Separate outside air damper and actuator provided for protection from outdoor elements when unit is not in use.
- D. Complete energy recovery ventilator installed on rails to allow the entire assembly to be slid out of the unit for service. Electrical and control wiring to damper assembly includes quick disconnect plug local to assembly.
- E. ERV Defrost Cycle: During the occupied mode, if the outside air temperature falls below 15F, the microprocessor controller will temporarily close the outside air damper and de-energize the outside air ventilation fan while the wheel and exhaust air ventilation fan continue to run to properly defrost the wheel.

### 2.9 MICROPROCESSOR DDC CONTROLS

A. Control System: A programmable microprocessor controller by the unit ventilator manufacturer mounted outside the air stream in the control panel. The controller is designed specifically for operating the unit in its most energy efficient manner using pre-engineered control strategies. The microprocessor determines mode of operation based on the factory installed return air and supply air temperature sensors.

- B. Factory installed controls with hot water heating: low speed supply fan. The microprocessor controller shall also modify the minimum damper position to compensate for mode of operation and fan speed.
- C. BACnet Card: The factory Microprocessor Control includes a plug-in card allowing for complete compatibility with an MS/TP BACnet control system.
- D. Wall Mounted Temperature Sensor and Humidity Sensors complete with display, limited occupied temperature adjustment, humidity setpoint adjustment and occupied override for a period of time.
- E. Head Pressure Control Transducer (unit mounted): Installed on liquid line to maintain sufficient head pressure (setpoint is user adjustable), providing required Hot Gas Reheat capacity through condenser fan modulation.
- F. Factory installed controls shall enable the unit to operate in the following modes:
  - 1. Free Cooling: Utilizing outside air.
  - 2. Heating: Hot water heat, high speed supply fan.
- G. Unit Ventilators Sequences of Operation:
  - 1. Setpoints:
    - a. Occupied Cooling Temperature Setpoint: 75 deg F (adj.)
    - b. Occupied Heating Temperature Setpoint: 70 deg F (adj.)
    - c. Occupied Dehumidification Setpoint: 55% RH (adj.)
    - d. Unoccupied Cooling Temperature Setpoint: 80 deg F (adj.)
    - e. Unoccupied Heating Temperature Setpoint: 60 deg F (adj.)
  - 2. Modes: The unit ventilator is designed to maintain the desired set point temperature within a conditioned space by switching and modulating via the programmable microprocessor, controlling the unit in the following occupied modes:
    - a. Free cooling using outside air.
    - b. Hydronic cooling stage 1 open valve to send chilled water to cooling coil.
    - c. Hydronic heating stage 1 open valve to send hot water to heating coil.
  - 3. Heating and Cooling (Hydronic):
    - a. If the return air temperature is below the set point the hot water control valve will modulate flow to the heating coil to control space temperature to the heating setpoint.
    - b. If the return air temperature is above the set point the chilled water control valve will modulate flow to the cooling coil to control space temperature to the cooling setpoint.
  - 4. Occupied and Unoccupied Mode: The interface card shall accept a signal from the building management system which will switch the unit between occupied and unoccupied modes. The occupied/unoccupied building modes are adjustable and

globally set by the BMS. Coordinate connection with the Tabernacle School District controls contractor for the respective building.

- 5. Fan:
  - a. Occupied: The fan will run continuously during occupied mode in low speed. If the third stage of cooling is energized (fan high), the fan will ramp to 100%. The fan will also have a dehumidification, or drying speed, controlled via the dehumidify output. The fan will have a run on or "purge" time of 6 minutes.
  - b. Unoccupied: The fan will energize when there is a call for cooling or heating based on the return air temperature and the controller's unoccupied setpoints.
- 6. Energy Recovery Wheel:
  - a. Occupied: The energy recovery wheel will energize when the unit is in occupied mode. If the outside temperature is warmer than the room, and heat is needed, the energy wheel will be turned off. If the outside air is cooler than the room air and cooling is required, the energy wheel will be off and free cooling (economizer mode) will be initiated.
  - b. Unoccupied: The energy recovery wheel will be off.
- 7. Outdoor Fan: The outdoor fan shall be controlled via a 0-10vdc control signal. The fan shall run in low speed (adjustable %) when the indoor fan is in low speed (Fan High Off). The fan will be off when the indoor fan is off. The fan shall be in high speed (adjustable %) when the indoor fan is in high speed (Fan High On) or when the compressor is at 100% (Comp Stage 2 On).
- 8. Return Air Sensor: This sensor will be used to control the unit during occupied and unoccupied times. It will be a NTC sensor mounted in the return air passage. If the sensor fails, the unit will go to full heat. If hot water heat is installed, the valve will open.
- 9. Supply Air Sensor: This sensor will be used in the economizer loop to maintain 55 deg F. It will also be used in the hot water loop to maintain 120 deg F. It will be a NTC sensor mounted in the supply fan inlet, or if hot water is installed, after the coil. If the sensor fails, the unit shall still run but the economizer will close.
- 10. Outside Air Sensor: This sensor will be used to enable economizer control and to override the heating valve in unoccupied. It will be a NTC sensor mounted in the outside air section.
- 11. Occupancy Sensor: Passive infrared sensor mounted on the exterior of the UV. Controls the unit's occupancy (in addition to the BMS scheduled occupied/unoccupied schedule) mode. If the sensor detects movement in the coverage area when the unit is in unoccupied mode, the unit shall switch to occupied mode. If the sensor detects no movement in the coverage area for a predetermined amount of time (adjustable) while the unit is in occupied mode, the unit shall switch to unoccupied mode or standby mode.
- 12. Indoor Coil Freeze Protection: This sensor will be attached to the indoor coil. If the coil temperature falls below the indoor coil temperature set point (28 deg F), the unit shall energize and outdoor air damper shall close.

#### 2.10 ACCESSORIES

- A. Disconnect Switch:
  - 1. Provide a power disconnect switch located on the control panel, sized for the full load amperage of the unit to enable the unit to be disconnected from the power supply prior to any maintenance. In the off position, the switch can be locked out.
- B. Duct Shroud:
  - 1. Duct shroud to be acoustically lined and shall be painted to match the unit and shall extend from the top of the unit to the ceiling. The plenum shall be shipped loose for field mounting. Coordinate required locations and required dimensions per field conditions and Architectural details.
- C. Outside Air Rear Extension:
  - 1. Insulated outside air rear extension for site installation between the back of the unit and the outside wall by the mechanical contractor.
  - 2. The outside air rear extension shall be complete with adjustable panels to allow for the exhaust air discharge to be at an adjustable height from floor of 28"- 34" (HS Classrooms).
    - a. Field-verify windowsill heights and coordinate final outside air rear extension depth.
  - 3. Coordinate required locations and required dimensions per field conditions and Architectural details.
- D. Duct Flange:
  - 1. Factory fitted discharge duct flange allowing for easy field connection of a discharge duct to top of the unit or side of the discharge plenum as indicated.
- E. Custom Wall Sleeve:
  - 1. Unit ventilator manufacturer to furnish a custom sealed plenum for the fresh air intake and exhaust air outlet on the back of the rear extension to the outside of the building.
  - 2. The wall sleeve is sized to accommodate the existing wall openings while ensuring the intake and exhaust airstreams are separated with an insulated horizontal splitter plate.
  - 3. A two-piece frame allows for the sleeve to adjust to wall depths between 8" and 14". Included double-sided gasket to create an air tight seal between the wall sleeves and the back of the unit.
  - 4. Coordinate wall sleeve dimensions with intake/relief louver and rear extension assembly.
- F. Valve Package:
  - 1. All valve packages shall be factory assembled, factory tested for leaks and factory installed where possible, otherwise, ship valve packages bagged and tagged for loose field installation.

- 2. Provide valves and controls valves in compliance with applicable Division 23 Sections, and in configurations indicated by the Drawings.
- G. Trim Pieces:
  - 1. Custom fabricated trim pieces manufactured in lengths and widths in 2" increments (final trimming and mounting by contractor) in a color and texture similar to the unit ventilator to finish the appearance of project.
- H. Outdoor Louver:
  - 1. Four inch deep outdoor louver furnished by unit ventilator manufacturer suitable for masonry, glass, or panel wall construction. Louver is flanged style with bird screen with finish and color per the Professional. Submit standard color charts for review.
  - 2. Louver installed by G.C.
- I. Remote digital thermostat with humidity sensor.
- J. Internally mounted phase failure relay.
- K. Internally mounted dirty filter switch.
- L. Occupancy Sensor: Passive infrared sensor covering up to 2000 sq. ft. of walking motion and 1000 sq. ft. of desktop motion.
- M. Condensate Float Switch: Monitor condensate levels in the evaporator coil drain pan. Should the float switch trip, the unit will continue to run but cooling will be disabled.

### 2.11 FACTORY START-UP AND TRAINING

A. Provide start up and customer training for the supplied equipment. Startup will be coordinated with the local representative.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas, with Installer present, to receive unit ventilators for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for piping and electrical connections to verify actual locations before unit ventilator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Install unit ventilators level and plumb.
- B. Install unit ventilators to comply with NFPA 90A.

#### 3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:
  - 1. Install piping adjacent, or above the machine to allow service and maintenance.
  - 2. Do not install any piping components behind new or existing casework.
- B. Ductwork installation requirements are specified in other Division 23 Sections. Connect supply and return ducts to units with flexible duct connections. Provide transitions to exactly match unit duct connection size.
- C. Ground equipment according to applicable Division 26 Sections.
- D. Connect wiring according to applicable Division 26 Sections.

#### 3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Tests and inspections include but are not limited to:
  - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
  - 3. Record temperatures entering and leaving energy recovery wheel when outdoor-air temperature is a minimum of 15 deg F higher, or 20 deg F lower, than room temperature.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Prepare test and inspection reports.

#### 3.5 CLEANING

- A. After installing units, inspect unit cabinet for damage to finish. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. After installing units, clean classroom unit ventilators internally according to manufacturer's written instructions.

C. Install new filters in each unit ventilator within two weeks after Substantial Completion.

# 3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain unit ventilators.
  - 1. Train maintenance personnel for 4 hours minimum on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining unit.
  - 2. Review data in maintenance manuals. Refer to applicable Division 01 Sections.
  - 3. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION 238223

# PART 6 - ELECTRICAL WORK

### SECTION 260010 - GENERAL REQUIREMENTS ELECTRICAL

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# PART 1 - GENERAL REQUIREMENTS ELECTRICAL

### 1.1 GENERAL

- A. The conditions of Divisions 00 and 01 apply to each and every Trade Contractor or other person or persons supplying any material or labor entering this building and/or site, either directly or indirectly. In the event of a conflict between Section 260010 and Divisions 00 and 01, the terms of Divisions 00 and 01 shall govern.
- B. One Building Trade, the Electrical Building Trade, will be covered by these General Requirements Electrical.
- C. For simplicity, this Building Trade will be referred to further herein as the Electrical Trade Contractor. The Electrical Specifications and all Electrical Drawings, together with all addenda make-up the Electrical Contract Documents, and are a part of the "Project Contract Documents", as described throughout these specifications.
- D. The term "Electrical Trade" as used in the Contract Documents, means the Electrical Building Trade.
- E. The term "indicated" means all information included, detailed, shown and/or implied on the Contract Documents.
- F. The term "existing" is used generally in reference to renovation projects. On new construction projects, the term "existing" is intended to mean work already in place.

# **1.2 SCOPE AND OBJECTIVES OF THE ELECTRICAL WORK**

- A. The Scope and Objectives of the Electrical Work of this Project include, but are not limited to:
  - 1. Refer to Division 01 for Scope of Work and of Alternate Bids;
  - 2. Periodic inspection of completed work and site conditions by the Electrical Trade Contractor's Project Manager to confirm compliance with contract documents and verify suitability to receive subsequent work.
  - 3. Remove existing electrical equipment where indicated;
  - 4. Provide new panels where indicated;
  - 5. Remove and replace light fixtures where indicated;
  - 6. Provide electrical branch circuit wiring where indicated.

#### **1.3** INTENT OF THE ELECTRICAL CONTRACT DOCUMENTS

A. The intent of the Electrical Contract Documents is to include all items and labor necessary for the proper execution and completion of the Work of the Electrical Trade Contractor. The Contract Documents of all Trades are complimentary to each other; what is required by one

shall be as binding as if required by all. Performance of the Electrical Trade Contractor is required only to the extent consistent with the Project Contract Documents and reasonably inferable from them as being necessary to produce the desired results.

B. It is expressly stipulated that neither the Drawings nor the Specifications shall take precedence over the other, and it is further stipulated that the Design Professional may interpret or construe the Drawings and Specifications so as to secure in all cases the result most consistent with the needs and requirements of the work. In the event of such ambiguity or discrepancy, comply with the higher cost product (material plus labor), the more stringent requirement, and supply the better quality or greater quantity of work.

# 1.4 PROPOSAL PREPARATION

- A. Prior to submitting a pricing quotation/proposal, proceed as follows, and include the following:
  - 1. Visit the site, survey, record, confirm and include in the scope of work, all material and labor necessary to install the equipment and systems indicated. Use the Contract Documents as diagrammatic in nature, since they are not intended to show all details which may affect the electrical bid proposal.
  - 2. Include the work, as applicable, to remove and dispose of conduit, wiring, light fixtures, devices, equipment and appurtenances, not required for new work, unless otherwise indicated to be abandoned in place.
  - 3. Include all disconnections, removals and temporary provisions required to permit rigging, installation, connection, testing and operation of the new equipment. Include all such provisions whether or not shown, detailed or specified within technical sections of the Contract Documents.
  - 4. Include in the work, the following:
    - a. One Project Manager;
    - b. One Project Foreman.
  - 5. Detail, layout, coordination and fit of all of electrical equipment. Plan all disconnections, removals, offsets, temporary provisions, as required, to fit the new equipment into the space, and as required to accommodate maintenance accessibility and service access.
  - 6. Maintain and submit for approval, a written project schedule, on a weekly basis.
  - 7. Organize, administrate, control and log the RFI process for their respective trade. Where applicable, submit all RFI(s) for master RFI log maintained by Lead/Prime Contractor.
- B. In preparing a Bid Price:
  - 1. Thoroughly review and confirm all existing conditions and Contract Document information. Make note in writing of any exceptions, misunderstandings, unclear areas, unclear directions, and any aspects which will prohibit completion of the work, in total. Failing to supply such notice, all bidders will be accountable for having accepted all conditions at the site which affect their work and their costs. By submitting a bid price, all Trade Contractors certify that the Contract Documents have been thoroughly reviewed and are sufficient for construction, and that the bidding Trade Contractors

have adequate information to establish and determine their responsibility for materials, methods, costs, and schedule for their work.

- 2. Incorporate all requirements of all sections of the Contract Documents.
- 3. Include the following with the Manufacturer's and Sub-Contractor's Lists:
  - a. The name and telephone number of all Sub-Contractors.
  - b. The manufacturer and model numbers of all equipment proposed by the bidder and as listed on all of the equipment schedules and specified in the Contract Documents.
  - c. Identify each subcontractor and manufacturer. Include reference to article number.

### 1.5 HAZARDOUS MATERIALS

A. The use of asbestos, PCB's or any material or product containing hazardous materials in the performance of this contract is not permitted. Certify, in writing, that no hazardous material or product containing a hazardous material, has been furnished or installed.

### 1.6 DRAWINGS AND SPECIFICATIONS

- A. It is the intent of the specifications and drawings to include under each item all materials, apparatus and labor necessary to properly install, equip, adjust and put into perfect operation the respective portions of the installations specified and to so interconnect the various items or sections of the work as to form a complete and properly operating whole.
- B. Any apparatus, machinery, small items not mentioned in detail which are necessary to complete or perfect any portion of the installation in a substantial manner and in compliance with the requirements stated, implied or intended must be furnished and/or installed without extra cost to the Project. This includes all materials, devices or methods peculiar to the machinery, apparatus or systems furnished and/or installed by the Electrical Trade Contractor.
- C. In referring to drawings, figured dimensions take precedence over scale measurements. Verify all wall locations, ceiling heights, elevations, dimensions, etc. on the architectural drawings, where applicable. Discrepancies must be referred to the Design Professional for decision. Certify and verify all dimensions, routings and layouts in the field and on the coordination drawings before ordering material or commencing work.
- D. Any work called for in the specifications, but not mentioned or shown on the drawings, or called for on the drawings, but not mentioned in the specifications, must be furnished and/or installed as though called for in both.
- E. When any device or part of equipment is herein referred to in the singular number, such as "the pump" such reference is deemed to apply to as many such devices as required to complete the installation.

F. The term "Provide" means "Furnish and Install". Neither term will be used generally in these specifications, but will be assumed. The term "Furnish" means to obtain and deliver to the job site for installation by other trades.

# 1.7 LAWS, ORDINANCES, REGULATIONS AND PERMITS

- A. The entire electrical system in all and/or in part must conform to all pertinent laws, ordinances and regulations of all bodies having jurisdiction, notwithstanding anything in these drawings or specifications to the contrary.
- B. Pay all fees and obtain and pay for all permits and inspections required by any authority having jurisdiction in connection with the work under this contract.
- C. Electrical work performed by the Electrical Trade Contractor must comply with the requirements of the National Electrical Code, NFPA and other boards and departments having local jurisdiction. Obtain and pay for all Electrical Inspections by local, municipal and state approving agencies. Inspections performed by the local inspector do not substitute for obtaining Independent Inspection by an authorized independent Electrical Inspection Agency.
  - 1. Qualifications: The EIA is to be an independent company from the Electrical Trade Contractor, registered with the State and a Master certified member of the International Association of Electrical Inspectors.
  - 2. Prepare and submit for review and comment to the Design Professional a schedule of inspections to be performed in coordination with the construction schedule.
  - 3. At a minimum, inspections shall be performed at the Rough-in, Progress and Final levels.
  - 4. The EIA shall submit written report for each level of inspection to the Design Professional to document compliance with current code requirements, including deficiencies and associated required remedial action.

# 1.8 CONNECTIONS TO UTILITIES

A. Apply for and obtain services from Utility Companies and municipalities. All charges for which Utility Companies and municipalities must be reimbursed must be paid for by the Electrical Trade Contractor at no additional cost to the Project.

#### 1.9 TESTS

- A. The following requirements are supplementary to tests specified for individual equipment or systems in other specification sections. Give written notice of date of test in ample time to all concerned.
- B. Concealed or insulated work must remain uncovered until all required tests have been completed; but if construction schedule requires, arrange for partial tests on portions of systems as approved. If a Prime Contractor covers or directs a Sub-Contractor to cover electrical work prior to completing the required tests, the Prime Contractor is responsible for any additional costs related to completing the required tests.

- C. As soon as conditions permit, conduct preliminary tests of equipment to ascertain compliance with specified requirements. Make needed changes, adjustments and/or replacements as preliminary tests may indicate, prior to acceptance tests.
- D. Conduct pressure, performance and operating tests as specified or required for each system or piece of equipment installed, modified or affected under this contract in presence of the Design Professional or Owner as well as a representative of agencies having jurisdiction.
- E. Obtain Certificates of Approval and/or Acceptance as specified or required in compliance with regulations of agencies having jurisdiction. Work will not be deemed complete until such Certificates have been delivered to the Design Professional.
- F. Prove conclusively, by testing, that electrical systems operate properly, efficiently and quietly in accordance with intent of drawings, specifications and most widely used construction practices.

### 1.10 CLEANING

- A. Be responsible for the following:
  - 1. Removal of all lumber, refuse, metal, piping and debris from site resulting from electrical work.
  - 2. Cleaning drippings created by the electrical work, from finished work of other Trades.
  - 3. Cleaning, polishing, waxing of electrical work as required.
- B. After testing, and acceptance of all work by the Design Professional and the Owner, thoroughly clean all electrical equipment and material to the satisfaction of the Design Professional.

# 1.11 INSTRUCTING OWNER'S PERSONNEL

- A. After all tests and adjustments have been made, fully instruct the representatives of the Owner in all details of operation of the equipment installed under the Electrical Contract Documents.
- B. Operate electrical equipment for sufficient length of time to satisfy Design Professional that requirements of Contract Documents have been fulfilled.
- C. Prepare digital recording of each Owner training session on compact disc.

# 1.12 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Provide in accordance with Division 01.
- B. Submit digital format PDF of Operating and Maintenance Instructions to the Design Professional for review and processing.

- C. Upon completion of the Design Professional's review and processing of digital format PDF of the Operating and Maintenance Instructions, submit three (3) copies of the final version of the printed instructions to the Owner. Bind instructions in separate, hardback, 3-ring loose leaf binders.
- D. Prepare instruction books by sections and include detailed Operating and Maintenance Instructions for all components of all systems, including wiring, and piping diagrams necessary for clarity. Identify the covers with the name of the project and the words "Operating and Maintenance Instructions - ELECTRICAL".
- E. Each section must have labeled tabs and be clearly marked with equipment or system name and contain detailed parts list data, ordering information therefore and the name, address and telephone number of the closest supply source.
- F. All instructional data must be neatly and completely prepared to the satisfaction of the Design Professional.
- G. Provide complete copy of all warranties in separate tab with the binder.
- H. Provide copies of the as-built drawings in the manuals.
- I. Provide copy of each submittal for each piece of equipment on the project, complete with all tag numbers, Contractor's Transmittal Cover Sheet and Design Professional's final Submittal Review Sheet.
- J. Provide compact disc of Owner training sessions with the manuals.
- K. Provide completer copy of the Electrical System Commissioning Report.

# 1.13 GUARANTEE

- A. All material, equipment and workmanship must be in first class operating condition in every respect at time of acceptance by Owner. Acceptance by the Owner will be by letter written to the Electrical Trade Contractor.
- B. Unconditionally guarantee in writing all materials, equipment and workmanship for a period of one (1) year from date of acceptance by Owner. During the guarantee period, repair or replace, at the Electrical Trade Contractor's expense, any materials, equipment or workmanship in which defects may develop and provide free service for all equipment and systems involved in the contract during this guarantee period. Beneficial use of any system by any of the Trade Contractors during construction does not constitute acceptance by the Owner. Time period of this beneficial use cannot be included in the guarantee period.
- C. Guarantee must also include restoration to its original condition of all adjacent work that is disturbed in fulfilling this guarantee.
- D. All such repairs and/or replacements must be made without delay and at the convenience of the Owner.

- E. Guarantees furnished by Trade Contractors and/or equipment manufacturers must be counter-signed by the related Trade Contractor for joint and/or individual responsibility for subject item.
- F. Manufacturers' equipment guarantees or warranties extending beyond the guarantee period described in item B above must be transferred to the Owner along with the Trade Contractor's guarantees.

### 1.14 ENTRANCE OF EQUIPMENT

- A. Determine the method of equipment entrance during initial site visit prior to bidding. Do not scale building openings, door widths and equipment or component sizes off the drawings. Determine sizes from site measurements and the equipment manufacturer. Include cost of equipment manufacturer's knockdown, use of field assembled equipment, field assembly, all work required for access, removals, replacements, general construction, and the like, as required. During preparation of submittals, verify whether knocked-down or predisassembled equipment have been proposed all to the extent required to permit entry of equipment to final location. Verify that the use of field assembled (not pre-assembled) equipment complies with manufacturer's warranty, guarantee, listings and requirements.
- B. Perform all necessary rigging required for completion of electrical work.
- C. Deliver products to the site properly identified with names, model numbers, types, grades, compliance labels and other information needed for identification. Deliver products and equipment to the site properly weatherproofed.
- D. The Trade Contractor who furnishes or purchases the product or equipment is responsible to provide and maintain protection from the weather, dust, dirt, construction debris, etc. until the project is complete.
- E. For all products and equipment which, when installed, have an opening into the building must be provided with a plywood cover, or similar protection, to prevent debris, rain, etc. from entering the building. The Trade Contractor who installs the product or equipment is responsible for such protection beginning at the time of installation.

# 1.15 VISIT TO SITE

- A. Due to the nature of the work involved under these Contract Documents, all bidders are required to thoroughly examine the site. Coordinate and schedule all site visits with the Owner.
- B. Thoroughly review Contract Documents prior to visiting the site, take Contract Documents to site and thoroughly explore to any extent necessary, the existing conditions as relating to fulfilling the requirements of these Contract Documents.
- C. If discrepancies are noted between requirements of Contract Documents and existing conditions, Trade Contractors must so indicate to Design Professional during bidding period

and receive clarification before bidding. Failure to comply with this requirement will result in Design Professional's interpretation during the construction period such that the Design Professional's decision will be final and binding as the sole interpreter of the contract requirements.

- D. Extras will not be considered for any work relating to connections with existing systems or adaptability of new systems to existing structures.
- E. Submission of proposals will be considered evidence that Trade Contractors have complied with the requirements of this Article.

# 1.16 REQUESTS FOR INFORMATION, RFI(s)

- A. Manage RFI(s) in a formal manner. Preparation and submission must comply with the process specified herein to be of maximum benefit to the project. Prepare, manage, and maintain an RFI Log. RFI(s) which do not comply with this process will be returned without comment.
- B. All RFI(s):
  - 1. Must be submitted in written form to the party designated at the construction phase kick-off meeting;
  - 2. Must be consecutively numbered, dated, and logged as directed, during the kick-off meeting;
  - 3. Those which are follow-up RFI(s), must use the same RFI number, with a sequential submission number;
  - 4. Must list the RFI number of any reference RFI(s) used in the narrative;
  - 5. Must present: background; related drawings; specification articles; room, space locations (as designated on Contract Documents including wing, column line designation, floor designation, and/or north, south, and the like), and must be presented as complete, clearly written thoughts, in legibly printed or typed form;
  - 6. Must be completed by the Electrical Trade Contractor's Designated Project Foreman, under the control and overview of the Electrical Trade Contractor's Project Manager;
  - 7. Must include Electrical Trade Contractor's Project Foreman's suggested resolution to RFI;
  - 8. Must evidence a high level of fluency with the Contract Documents, all job progress correspondence, all Addenda, all Construction Bulletins, and specifically the Mechanical/Electrical Specifications including: all specifications.
- C. The Electrical Trade Contractor's designated Project Manager must demonstrate familiarity with and responsibility for all RFI(s) prepared by the Project Foreman and must periodically submit an initialed log of RFI(s) signifying control of RFI(s) relating to specification and job scope issues.
- D. Issues relating to job scope, work included, methods and means which are either clearly discernable from the Contract Documents and/or clearly the responsibility of the Electrical Trade Contractor must be answered by his Project Manager and resolved between the Foreman and Project Manager prior to resorting to written RFI(s). The work of the Project Manager must evidence: fluency with the methods and means anticipated by the Electrical

Trade Contractor during the bid phase to plan and complete the work; fluency with the Contract Documents, and all administrative issues related thereto.

E. Items or issues which relate to non-compliance to associated codes or regulations must reference code interpretations or the published adopted code or regulation. The reference must be either an excerpt of the code or regulation, published addenda to the code or regulation, a formal interpretation written by a representative of the associated agency, or letter of non-compliance from the Authority Having Jurisdiction. All cited code requirements must include the applicable code title, code version or date, and code section number designation. If the RFI does not contain the required information, the RFI will be returned without comment.

# 1.17 AS-BUILT DRAWINGS

- A. Prepare reproducible (paper) and electronic (cd) record documents in AUTOCAD .dwg format (Version 2000 or later) in accordance with the requirements in Division 01. Use commercial CAD drafting service if Electrical Trade Contractor does not have CAD capabilities in-house. As an option, if requested by the Electrical Trade Contractor, an electronic copy (AutoCad .dwg format) of any of the Electrical Contract Drawings may be provided by the Design Professional at a cost of \$250.00, paid in advance, to the requesting Contractor. In addition to the requirements specified in Division 01, indicate the following installed conditions:
  - 1. Indicate actual inverts and horizontal locations of underground electrical transmission and distribution equipment, and the like.
  - 2. Equipment locations (exposed and concealed), dimensioned from prominent building lines and annotated with permanent equipment number approved by Owner. Include code and equipment service clearances.
  - 3. Approved substitutions, Addenda and Bulletin Contract Modifications, and actual equipment and materials installed.
- B. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located, as specified in Division 01, to record the locations and invert elevations of the underground electrical work.

# 1.18 SERVICING OF EQUIPMENT AND SYSTEMS

- A. After work has been completed in accordance with the Contract Documents, and prior to final acceptance tests, each Trade Contractor must have manufacturers or their authorized agents of the equipment installed, completely check their equipment and put equipment into proper operation. In each case, the respective Trade Contractor must have the manufacturers thoroughly check the complete installation of the equipment, furnished by the manufacturer, for proper and correct operation under the service intended.
- B. Six months after final acceptance of the work under the Contract Documents, each of the Trade Contractors must have the manufacturers again check their equipment for proper operation and lubrication. Coincidentally, these Trade Contractors must assure that the Owner is properly instructed in the servicing of the equipment.

C. Prior to expiration of the guarantee period, each Trade Contractor must check all equipment, materials and systems for which he is responsible, make necessary adjustments and/or replacements, and leave systems in first class operating condition.

# 1.19 SERVICING OF EQUIPMENT AND SYSTEMS (EXISTING/UNMODIFIED)

A. Selected, designated existing electrical systems and equipment are planned to be continued in service upon project turnover, with no specified repair/modification covered under the Contract Documents. The Owner reserves the right to request repair/maintenance labor and materials, as an Owner requested change, depending on the results presented in the Electrical Trade Contractor's Evaluation Report.

### 1.20 CONTINUITY OF SERVICES

- A. Generally, no actions can be taken by the Electrical Trade Contractor that will interrupt any of the existing building services for these buildings or any other building until previously arranged and scheduled with the Design Professional and Owner.
- B. Should any service be interrupted by the Electrical Trade Contractor, immediately provide all labor, including overtime if necessary, and all material and equipment necessary for restoration of such service, at no additional cost to the Project.

### 1.21 CONTINUITY OF INTERIOR BUILDING SERVICE UTILITIES

- A. For the purposes of this specification section, "Building Service Utilities" include, but are not limited to:
  - 1. Exterior: electrical; domestic water; fire protection water; sanitary; storm; chilled water; space heating water; fuel lines; communication cable; fire alarm; remote metering lines; telemetry lines; and the like;
  - 2. Heating piping systems, complete;
  - 3. Chilled water piping systems, complete;
  - 4. Heating and process steam/condensate systems, complete;
  - 5. Ductwork systems, complete;
  - 6. Medical gas systems, complete;
  - 7. Fire protection systems, complete;
  - 8. Control systems, complete;
  - 9. Plumbing, drainage and storm systems, complete;
  - 10. Process piping systems, complete;
  - 11. Electrical conduit and wiring systems, complete;
  - 12. Electrical lighting and wiring devices, complete;
  - 13. Electrical fire alarm and security systems, complete;
  - 14. Electrical communication systems, complete.
- B. Plan work and schedule to prevent interruption of all Utility System Services. Refer to the "Scope and Objectives of the Electrical Work," of this Section for a description of: unmodified

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systems, unmodified equipment; spaces wherein mechanical and electrical systems are unmodified; and Utility System Services external to the individual building or buildings addressed by the work of this project.

- C. Plan work and schedule installation and connections of all Utilities to minimize or prevent interruption of all Utility System Services. Refer to "General Requirements Electrical," Article "Scope and Objectives of the Electrical Work."
- D. The work required for continuity of these systems on this project includes, but is not limited to, providing all labor and material required for: site investigation/verification; disconnect; removal; rerouting; reconnection; as-built drawing documentation; testing and check out of mechanical and electrical services serving equipment which are implied to be, or specifically indicated to be, continued in operation.
- E. All materials required for relocation work must comply with these specifications. Carefully review all phasing drawings, all Construction Trade drawings, and complete all necessary and prudent site visits to become familiar with all existing building operations, systems and equipment which may be continued, independent of the work of this project, and include all required relocation work described in this section.

# **1.22** TEMPORARY FACILITIES, UTILITIES AND HEATING

A. Refer to the general construction contract documents of these specifications.

# **1.23 SMOKE AND FIRESTOPPING (GENERAL)**

- A. Furnish and install a material or a combination of materials to form an effective barrier against the spread of flame, smoke and gases, and to maintain the integrity of the "fire and/or smoke" rated construction. Refer to the general construction contract documents. Fire and smoke rated construction is identified on the general construction contract documents. Provide firestopping in the following locations:
  - 1. Pipe and conduit penetrations through above grade floor slabs and through "fire and/or smoke"-rated partitions and fire walls.
  - 2. Penetrations of vertical shafts including, but not limited to pipe chases, duct chases, elevator shafts, and utility chutes.
  - 3. Other locations where indicated or required.
- B. Prepare submittals and submit for approval. Include manufacturer's descriptive data, typical details, installation instructions and the fire/smoke test data and/or report as appropriate for the time rated construction and location. The fire/smoke test data must include a certification by a nationally recognized testing authority that the material has been tested in accordance with ASTM E 814, or UL 1479 fire tests.
- C. Deliver materials in the original unopened packages or containers showing name of the manufacturer and the brand name. Store materials off the ground, and protect from damage

and exposure to elements. Damaged, deteriorated or outdated shelf life materials shall not be used and must be removed from the site.

### **1.24** TRADE CONTRACTOR'S CERTIFICATION

A. Upon final completion of all work, each Trade Contractor must provide a notarized letter on Corporate letterhead, executed by a Corporate Officer, or Company Partner, stating that the work has been completed in accordance with the Contract Documents, Addenda, Bulletins, Trade Contractor's Punch List items and Design Professional's Construction Observation Report(s). Final Payment will not be approved until the notarized letter has been provided. Refer to the following sample letter.

SAME	PLE LETTER
ENGINEER/ARCHITECT	
TRADE CONTRACTOR	
PROJECT	NO
I hereby certify that all work under the HN Contract Documents, as applicable, includ Construction Observation Reports, has be of the work has been performed in accord	AC, Plumbing, Fire Protection and Electrical ding all addenda, bulletins, Punch List items and een completed and the quality and workmanship dance with Contract Documents.
	State of:
	County of:
Trade Contractor:	Subscribed and Sworn to before me this day of 20
	Notary Public:
By: Date:	My Commission Expires:

# PART 2 - PRODUCTS

### 2.1 MANUFACTURER'S AND SUB-CONTRACTORS LIST, KEYMEN RESUMES

- A. Before ordering any material or equipment unit, and not later than ten (10) working days after signing of contracts, submit a list of Manufacturers, Sub-Contractors and Suppliers showing make, type, manufacturer's name and trade designation of all materials, and equipment, proposed for use under this contract. Prepare list by reference to specifications. Identify all long lead submittals which will require an expedited submittal review.
- B. Refer to the Article "Proposal Preparation," in this section. Specifically designate the labor force required of the Electrical Trade Contractor. As part of the mobilization phase of the work, submit resumes for each Keyman including the Project Manager and Project Foreman.
- C. These lists, when approved, will be supplementary to specifications, and no variations therefrom will be permitted except with the approval of the Design Professional.
- D. Prepare the list using the "PROPOSED MANUFACTURERS AND SUB-CONTRACTORS LIST" located at the end of this section.
- E. Submittals will not be processed until the requirements of this Article are satisfactorily completed.

#### 2.2 SUBMITTALS

- A. Provide digital submissions (.pdf format) for all material and equipment as noted in Proposed Manufacturer's and Sub-Contractors List, except where indicated otherwise herein.
  - 1. Prior to submission of product data, shop drawings, and samples, notify the Design Professional of any site conditions differing from those indicated or specified.
  - 2. Prior to submission of product data, shop drawings and samples to the design professional, the HVAC Trade Contractor, the Plumbing Trade Contractor and the Fire Protection Trade Contractor shall submit all submittals which require electrical power to the Project Electrical Trade Contractor for the HVAC Trade Contractor's, the Plumbing Trade Contractor's, the Fire Protection Trade Contractor's and the Electrical Trade Contractor's coordination and review. The Electrical Trade Contractor shall provide approval of electrical power requirements for the HVAC, Plumbing and Fire Protection Trade Contractors' proposed equipment.
  - 3. All submittals of equipment requiring electrical power must be accompanied by the "HVAC AND ELECTRICAL CONTRACTORS' COORDINATION OF HVAC EQUIPMENT ELECTRICAL REQUIREMENTS TRANSMITTAL COVER SHEET", the "PLUMBING AND ELECTRICAL CONTRACTORS' COORDINATION OF PLUMBING EQUIPMENT ELECTRICAL REQUIREMENTS TRANSMITTAL COVER SHEET" and the "FIRE PROTECTION AND ELECTRICAL CONTRACTORS' COORDINATION OF FIRE PROTECTION EQUIPMENT ELECTRICAL CONTRACTORS' COORDINATION OF FIRE PROTECTION EQUIPMENT ELECTRICAL REQUIREMENTS TRANSMITTAL COVER SHEET", as applicable, all located at the end of this section. Submittals without this Cover Sheet or an incomplete Cover Sheet will be rejected without review.

- 4. All submittals must be accompanied by the "ELECTRICAL CONTRACTOR'S TRANSMITTAL COVER SHEET" located at the end of this section. Submittals without this cover sheet or with an incomplete cover sheet, will be rejected without review.
- 5. All submittals must be accompanied by the "ELECTRICAL SUBMITTAL LOG", located at the end of this section. Submit log after final acceptance of the proposed Manufacturer's and Sub-Contractor's list. Revise and update the log with each submittal. Submittals without these logs or without an updated log will be rejected without review.
- 6. Specifically annotate and sign all exceptions, deletions and additions that vary from the Project Contract Documents. Failing to provide signed annotations for all deletions and additions, recognize and accept that Contract Documents will govern, and will be used to resolve disputes.
- B. Prepare submittals by careful reference to: drawings and specifications; preparatory layout of all work; coordination with all proposed equipment; coordination with related submittals and the work of all other Trade Contractors; space requirements; and Utilities defined in this Section. A review of such submittals by the Design Professional, which include drawings, schedules, and catalog cuts provided by the Trade Contractors, their Sub-Contractors, manufacturers, and vendors, shall not relieve the Trade Contractors from the responsibility for correcting all errors of any sort in the submittals, either identified or undetected by such review.
- C. Regularly provide and update submittal log sheets listing submittal number, product, applicable specification section, dates of submittal and receipt and status. Identify each submittal by Job Name, log number and reference to applicable Specification Article number.
- D. All equipment submittals must include, but not be limited to, the following:
  - 1. Manufacturers' catalog designation, photographs and specifications.
  - 2. Full electrical data, including specifically, electrical characteristics.
  - 3. Full General Construction data, including operating weights, dimensional data including service access space. Data shall be given to the General Construction Trade Contractor, where applicable, for use in setting steel, supports, and attachments.
  - 4. Full wiring diagrams, including clearly identified power connections and control connections. Data and diagrams shall be given to the Automatic Temperature Control (ATC) Trade Sub-Contractor for their use and inclusion into their submittals.
  - 5. Listing of specific electrical performance, calculations and data.
  - 6. Dimensions, capacities, ratings, material and finish.
  - 7. Complete the submittal by listing all available options, accessories, configurations and materials, and legibly strike out with single thin line all proposed deletions. Clearly signify whether each and every manufacturer's option, accessory, configuration and material choice is included and which is excluded by the submission.
  - 8. Annotation of equipment, devices, systems as indicated by the Contract Documents (PNL-1, etc.).
  - 9. Certification of testing by agencies such as ETL, ARI, UL, etc.
  - 10. Such other detailed information as required for proper evaluation.
- E. Review Time:

- 1. Allow two (2) weeks after Design Professional's receipt for the Design Professional's processing of each submittal, exclusive of Owner's, or other's review in the processing chain. Allow a longer time period where processing must be delayed for coordination with subsequent submittals.
- F. Submittals for electric motor starters must include a tabulation listing the following:
  - 1. The equipment the starter is intended to control.
  - 2. Horsepower and starter size.
  - 3. Voltage.
  - 4. Phase.
  - 5. Full load amperes.
  - 6. The manufacturer's number or type.
  - 7. Heater numbers and amperage.
  - 8. Quantity of auxiliary contacts required by ATC and fire alarm systems.
  - 9. Pushbutton arrangement.
  - 10. Pilot light arrangement if applicable.
- G. Submittals for automatic temperature controls must be coordinated with: 1) all electrical equipment manufacturers' and vendors' submittals including review of electrical submittals by ATC Sub-Contractor for conformance with sequences of operation for each piece of equipment; 2) all electrical requirements of ATC System with Electrical Trade Contractor; and 3) all fire and safety requirements of the Fire Alarm System. ATC submittals shall include copies of all wiring diagrams for all electrical equipment with points of connections clearly identified. ATC submittals shall not be developed and submitted until Electrical Trade Contractor provides all equipment submittals for review.
- H. The Design Professional's recommendation of acceptance of the equipment proposed by the Electrical Trade Contractor is conditional upon the Electrical Trade Contractor fulfilling all obligations of the Contract Documents. By furnishing the proposed equipment, the Electrical Trade Contractor acknowledges compliance with all of the following:
  - 1. Field layout is completed and planning of proposed equipment has coordinated with all related submittals, related trades and space requirements.
  - 2. The Electrical Trade Contractor has reviewed and approved all submittals prior to submission. Provide all submittals with a signed approval stamp, signifying the following: 1) all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data have been verified; 2) the Design Professional has been notified of all site conditions which affect the work, and which require design resolution, as opposed to resolution by trade decisions; 3) all items are approved by the Electrical Trade Contractor, and have been coordinated and checked with other applicable submittals, and contract requirements; 4) submission is clearly marked to indicate which manufacturer's options are provided and which are not provided for the proposed equipment; and 5) manufacturers and/or equipment suppliers have been given a set of the contract documents for their review and use as the basis of the submittals.
  - 3. Any and all exceptions requested by the Electrical Trade Contractor are provided in writing with the submittals. All exceptions, deletions and additions that vary from the

Contract Documents have been specifically annotated and initialed. Failing to provide initialed annotations for all deletions and additions, the Electrical Trade Contractor accepts the condition that the Contract Documents will govern, and will be used to resolve disputes.

- 4. Submittals without the Electrical Trade Contractor's signed stamp of approval will be returned without review. Initialed approval stamps are not acceptable.
- 5. The Design Professional's acceptance of the proposed equipment constitutes the Engineer's formal approval that the engineering performance and operational utility requirements, of the proposed equipment, match the Design Professional's specified and designed performance requirements. By entering into these Contracts, the Trade Contractors agree that the purpose of submittals is to demonstrate to the Design Professional that the Trade Contractors understand the design concept and that they demonstrate their understanding by indicating which materials and equipment they intend to furnish, install and use.
- I. Secure submittals smaller than 8-1/2 x 11 to paper of this size.
- J. Material and equipment fabricated, furnished and/or installed or used without the Design Professional's review are subject to rejection by the Design Professional.
- К. Corrections or comments made on submittals during review by the Design Professional do not relieve the Electrical Trade Contractor from compliance with the requirements of the Contract Documents. Such review will be only for general conformance with the design concept, and the information given in the Contract Documents and does not include review of quantities, dimensions, sizing, pressure drops, weights or gauges, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the Electrical Trade Contractor. Review of a specific item does not indicate acceptance of an assembly of which the item is a component. The Design Professional is not responsible for any deviations from the Contract Documents that are not clearly noted by the Electrical Trade Contractor. The Design Professional will not review partial submissions or those for which submissions for correlated items have not been received. The Electrical Trade Contractor is responsible for: confirming and correlating all quantities, clearance, and dimensions; selecting fabrication processes and techniques of construction; coordinating work with all other Trades, and performing his work in a safe and satisfactory manner.
- L. All submittals must be able to be reproduced. The Electrical Trade Contractor is responsible for all reproduction and distribution to the General Construction Trade Contractor and all other Trade Contractors as applicable.
- M. If requested for the Electrical Trade Contractor's use in the preparation of submittals, an electronic copy (AutoCad .dwg format) of any of the Electrical Contract Drawings may be provided by the Design Professional, after receipt of a signed indemnification agreement, at a cost of \$250.00, paid in advance, by the Electrical Trade Contractor.
- N. For additional requirements regarding submittals, refer to Article "Additional Trade Contractor Paid fees and Expenses" in Part 3 of this section.

### 2.3 MATERIALS AND EQUIPMENT

- A. All materials and equipment must be new and conform to the grade, quality and standards specified herein.
- B. All equipment offered under these specifications is limited to products regularly produced and recommended for service ratings in accordance with engineering data or other comprehensive literature made available to the public and in effect at the time of opening of bids. Testing agency seals, decals and/or nameplate shall be attached to and visible on all equipment.
- C. Items such as valves, motors, starting equipment, vibration isolating devices, and all other equipment and material, where applicable and practicable, must each be of one manufacturer.
- D. Install equipment in strict accordance with manufacturer's instructions for type and capacity of each piece of equipment used. Obtain these instructions, which will be considered part of these specifications. Type, capacity and application of equipment must be suitable and operate satisfactorily for the purpose intended in the electrical systems.

# 2.4 EQUIPMENT VARIATIONS AND SUBSTITUTIONS

- A. Equipment Substitution Definition as follows:
  - 1. A product that is neither the Basis of Design, nor one of the named Alternative Manufacturing Sources.
  - 2. Unless noted otherwise in the Contract Documents, substitutions may be considered after the award of Contracts. Subsequent requests will be considered only when, through no fault of the Electrical Trade Contractor, none of the specified products are available.
- B. Equipment Variation Definition as follows:
  - 1. A product that is not the Basis of Design, but is named as one of the specified Alternative Manufacturing Sources.
- C. The manufacturers listed in Part 2 of all technical specifications are considered Alternative Manufacturing Sources as described in Paragraphs A and B above.
- D. "Subject to compliance", as used in these specifications, means compliance with all the requirements of the Contract Documents.
- E. The materials and products mentioned in these Contract Documents are specified to establish a standard of: material of manufacture; independent testing agency certifications; quality; function; design; and performance. The phrases "Basis of Design," "standard of design," and "equivalent acceptable," are used to indicate that other similar, comparable products may be used provided such substitutes or variations are accepted by the Design Professional as meeting all the salient characteristics and standards necessary, such as: material of manufacture; independent testing agency certifications; quality; function; design; and

performance, to meet the Owner's needs and meet the objectives of the Design Professional's Project Design.

- F. Where Alternative Manufacturing Sources are listed for an item:
  - 1. Selection must be either the Basis of Design or one of those listed Alternative Manufacturing Sources.
  - 2. There is no guarantee implied that each and every manufacturer listed can meet or exceed the salient characteristics, such as: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as Basis of Design.
- G. Each Trade Contractor is responsible to contact each proposed equipment manufacturer's representative and confirm, prior to preparing submittals, the proposed manufacturer's product meets or exceeds the: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design. Final acceptance will be determined by the Design Professional, whose decision is final.
- H. Submittals offered as an Equipment Variation from the Basis of Design shall include a letter, on the product manufacturer's letterhead, certifying that the proposed product is a Comparable Product to the product specified as the Basis of Design and conforms to all the salient characteristics, including: material of manufacture; quality; function; design; and performance of the product specified as the Basis of Design. If directed by the Design Professional for Products offered as an Equipment Variation, the Offerer shall provide a Letter of Confirmation from a Registered, Professional Engineer attesting that the Proposed Equipment Variation conforms to all the salient characteristics, including: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design.
- I. Specific products specified without use of the term: equal; equivalent; comparable product; substitution; or similar term; constitute a proprietary specification, and must be provided as specified, unless a written request is submitted to the Engineer for approval up to ten (10) days after the date of project award. Such requests must include a complete description of the proposed product, along with sufficient documentation and other information necessary for a complete evaluation of the proposed product. Such Trade Contractor Requests shall include a letter, on the product manufacturer's letterhead, certifying that the proposed product is a Comparable Product and conforms to all the salient characteristics, including: material of manufacture; independent testing agency certifications; quality; function, design; and performance of the specified product. If approved, the proposed product will be listed in an addendum to notify all bidders that such acceptance has been granted by the Design Professional. If not approved, provide the specified product.
- J. Provide Calculations, signed and sealed by a Professional Engineer registered in the State in which the work is taking place, engaged by the Electrical Trade Contractor, confirming that the equipment proposed as either a Substitution, or Variation, is a Comparable Product to the product specified as the Basis of Design and conforms to all the salient characteristics, including: material of manufacturer; independent testing agency certifications; quality;

function; design; and performance of the product specified as the Basis of Design. Provide such calculations for major pieces of equipment (emergency generators, switchgear, transformers, etc.). The Design Professional, whose decision will be final, will determine which products will require calculations during the submittal review process.

- K. The Contract Documents have been founded upon Engineering Design selection of materials, products, and pieces of equipment listed at the Basis of Design. In the event that the incorporation of an approved Substitution, Variation, or assembly, into the work, requires revisions or additions to the contractual requirements of either the Trade Contractor proposing the substitution or variation, or any other Trade Contractor, the Trade Contractor proposing the substitution or variation, shall bear the cost of: such revisions or additions to the work of the Trade Contractor proposing such Substitution and/or Variation; any expenses of all affected trades; and all engineering or architectural services required at no change in the contract sum.
- L. The equipment specifications indicated on the drawings, or in Part 2 of each of the technical specifications, may or may not indicate or include all of the required salient characteristics, components and accessories included with the specified product. Include cost for all such characteristics, components and accessories required to meet or exceed the: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design.
- M. For requirements regarding equipment variations after bid award, refer to Article "Additional Trade Contractor Paid Fees and Expenses" in Part 3 of this section.
- N. Each Trade Contractor negotiating for pricing advantages affecting the Trade Contractor's Bid shall comply with the directives included herein, bear full responsibility for the accuracy and completeness of the submissions required of the Vendor selected by the Trade Contractor. The Proposing Trade Contractor shall bear full responsibility for all extra costs of the Design Professional shown to have resulted from inaccurate, and/or incomplete compliance with the directives included in this Specification Article.
- O. All decisions provided by the Design Professional, described herein, shall be final.

# 2.5 VIBRATION ELIMINATION

- A. Provide vibration isolation support provisions for all moving or rotating equipment, machinery and transformers when such provisions are not furnished and/or integrally mounted by the equipment manufacturers. Install in accordance with vibration isolation manufacturer's recommendations unless specified otherwise herein.
- B. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Amber/Booth Company;
  - 2. Korfund Company, Inc.;
  - 3. Mason Industries;
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.

- C. Provide all rotating or moving machinery or equipment mounted on, or suspended from, building structure with approved resilient suspension isolation mountings.
- D. Provide vibration isolating connections between all pumps and connecting piping. Length, size, and stiffness as recommended by vibration isolator manufacturer.
- E. Use flexible metallic conduit for all electrical connections to moving or vibrating equipment, such as motors, generators, transformers, and the like.
- F. Rigid pipes, conduit or other extended machine assemblies connected to vibration isolated equipment are not permitted to be tied in directly with the building construction. Connect such elements to the equipment through flexible fittings, and support using isolating equipment as required.
- G. All systems must operate free from objectionable vibration and noise. Take all necessary steps required to achieve this result without additional cost to the Project.

### 2.6 NOISE CONTROL

A. Noise levels in all 8 octave bands due to equipment and systems shall not exceed NC 35 within the occupied room, except as follows:

TYPE OF ROOM	NC LEVE	L
Audio Suites, Audio Speech Pathology, Phono/Cardiology	25	
Operating Rooms	4	40
Offices, large open	4	40
Lobbies, Waiting Areas	40	
Corridors	4	40
Bath Rooms and Toilet Rooms	4	40
Laboratories	4	45
SPD, Dining Rooms, Food Service/Serving, Therapeutic Pools	45	
Kitchens, Locker Rooms, Warehouses, Shop, Laundries,		
Gymnasiums, Recreation Rooms	Ę	50
X-Ray & General Work Rooms	40	

- B. For equipment which has no sound power ratings scheduled on the plans, select equipment such that the fore-going noise criteria, local ordinance noise levels, and OSHA requirements are not exceeded. Selection procedure shall be in accordance with ASHRAE 2015 HVAC Applications Handbook, Chapter 48, NOISE AND VIBRATION CONTROL.
- C. An allowance, not to exceed 5db, may be added to the measured value to compensate for the variation of the room attenuating effect between room test condition prior to occupancy and design condition after occupancy which may include the addition of sound absorbing material, such as, furniture. This allowance may not be taken after occupancy. The room attenuating effect is defined as the difference between sound power level emitted to room and sound pressure level in room.

- D. In absence of specified measurement requirements, measure equipment noise levels three feet from equipment and at an elevation of maximum noise generation.
- E. If sound levels are exceeded, provide sound reducing devices, including, but not limited to: sound attenuators; acoustic enclosures; additional equipment insulation or vibration isolators to conform to these specifications. Provide required material and labor at no additional cost to the project.

### 2.7 INSERTS, HANGER SUPPORTS, CLAMPS, FASTENINGS

- A. All materials, designs and types of inserts, hanger supports and clamps must meet the requirements of the latest edition of the Manufacturers Standardization Society Document MSS-SP-58, Underwriters Laboratories, Inc., National Electrical Code and Factory Mutual Engineering Division Standards where applicable. Insert, hanger support and clamp types referenced herein are shown in MSS-SP-58.
- B. Provide all necessary inserts, hanger supports, fastenings, clamps and attachments necessary for support of the electrical work. Select the types of all inserts, hanger supports, fastenings, clamps and attachments to suit both new and existing building construction conditions specifically for the purposes intended.
- C. In new overhead cast-in-place concrete construction, provide type 19 steel concrete inserts and fasten to form work before concrete is cast. For cast concrete floor or roof sections too thin to permit the use of inserts, extend the hanger rod through the slab and terminate with a nut and large washer, recessed into the top face of the slab as approved by the Design Professional.
- D. Clamps and attachments to steel beams and bar joists must be made using types 20, 21, 23, 25, 27, 28, 29 or 30 as applicable to suit conditions of construction. Clamps and attachments must be selected on the basis of the required load to be supported. Provide all necessary steel angle iron or channel between bar joists, or steel beams where direct attachment cannot be made. Holes are not permitted to be drilled or burned in structural building steel for hanger rod supports. Welding of hangers or supports to structural steel is prohibited unless approved beforehand by a Structural Engineer.
- E. Metallic masonry anchors may be provided for all pre-cast concrete, masonry and cast concrete construction as an alternate to item (C) above. Locate in pre-cast and cast-in-place concrete as directed by the Structural Engineer. Select and install as recommended by the anchor manufacturer for the various applications, stresses and services involved. Accomplish installation of masonry anchors by pre-drilling concrete or masonry to diameters and depths required to properly accommodate anchor bolts.
- F. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Dynabolt;
  - 2. Ram-In;
  - 3. Tru-Bolt manufactured by Ramset;
  - 4. Redhead;

- 5. Hilti;
- 6. Wej-It;
- 7. Or approved equal in accordance with the project substitution provisions of the contract.
- G. Toggle bolts may be used in dry wall and lath and block plaster walls. The use of toggle bolts is restricted to the weight limitations imposed by the toggle bolt manufacturer for the size used.
- H. Except where noted otherwise herein, attachment to wood or material of similar fibrous nature must be made with lag screws and/or wood screws of required size.
- I. Screws with wooden or plastic plugs, or lead anchors are not acceptable.

# 2.8 ACCESS DOORS AND PANELS

- A. For projects which include the work of a General Construction Trade Contractor, furnish and locate for installation under General Construction, all access doors and panels for concealed portions of electrical work requiring accessibility for operation and maintenance. If project does not include a General Construction Trade Contractor, provide access doors as required.
- B. Access doors and panels may not be installed without specific approval of the Design Professional as to location. The proposed location of access doors and panels must be reviewed with the Design Professional and the General Construction Trade Foreman, where applicable, and the locations indicated on the coordination drawings prior to installation of equipment, access doors or panels. Controversies must be resolved at no cost to the Project.
- C. Minimum size of 24" x 18" unless shown, specified or approved otherwise.
- D. Sixteen (16) gauge minimum construction with concealed spring hinges, screw fasteners and painted finish. Color by Architect.
- E. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Milcor;
  - 2. Karp;
  - 3. Mifab;
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.
- F. For access doors in drywall, provide drywall bead flange.
- G. For access doors in hard plaster or ceramic tile, provide expanded metal casing bead.
- H. For access doors in unplastered masonry and concrete, provide one piece frame for flush mounting.
- I. For access doors in acoustic tile ceilings, provide recessed door panel with room to receive acoustic tile.

J. Underwriters "B" label access doors where required for access to shafts, corridors, and where located in fire walls and partitions.

# 2.9 EQUIPMENT ANCHOR BOLTS

- A. Provide and set in place at the time concrete foundations, bases or curbs are poured or formed, all necessary anchor bolts as required for the various equipment specified herein, with hook type anchor bolts of proper size and length to suit the apparatus as recommended by the equipment manufacturer. Set bolts in pipe sleeves of approximately twice the bolt diameter and of length equal to the embedded length of the bolt, with sleeves terminating flush with finished surfaces of foundations, bases or curbs.
- B. When the equipment is set in its proper position and aligned with the anchor bolts, the space between the anchor bolts and the inside wall of the sleeves must be completely filled with non-shrink cementitious grout.
- C. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Crystex as manufactured by L & M Construction Chemicals, Inc.;
  - 2. Master Builders;
  - 3. BASF;
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.
- D. When a General Construction Trade Contractor provides concrete foundations, bases or curbs, the Electrical Trade Contractor is responsible for all anchor bolts required by the equipment he provides, under the Contract Documents. Assign a supervisory representative to be present at the time foundations, bases or curbs are poured or formed. For projects wherein there is no General Construction Trade Contractor, the Electrical Trade Contractor is responsible for pouring, locating, and setting equipment foundations, bases and curbs and the location of anchor bolts for the equipment provided or installed by him on this Project.
- E. All anchor bolts must be of sufficient strength to withstand any loading imposed by the attached materials or equipment.

# 2.10 PIPING AND CONDUIT SLEEVES

- A. Provide all sleeves required for electrical work and be fully responsible for the final and permanent locations thereof.
- B. Provide sleeves in the following locations:
  - 1. All pipes and conduits passing through all cast-in-place concrete construction and masonry walls.
  - 2. All pipes and conduits passing through cast-in-place waterproof concrete construction and waterproof masonry walls.

- C. Extend through construction and finish flush with each surface except where noted otherwise. Provide for a minimum ½" clearance around conduit, pipe or its covering in the instance of pipe covered with insulation.
- D. All sleeves in waterproof walls and floors must be fitted and sealed with positive hydrostatic mechanical seals. Sleeves must be sized accordingly. Mechanical seals must be placed around piping and/or conduit and inserted into void between inner wall of sleeve and piping and/or conduit. Tighten mechanical seals as required for watertight seal.
- E. Subject to compliance with the requirements, provide products by one of the following:
  - 1. "Link Seal" as manufactured by Thunderline Corporation;
  - 2. Advance Products and Systems, Inc.;
  - 3. Proco Products, Inc.;
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.
- F. All sleeves must be Schedule 40 steel pipe finished with smooth edges. Sleeves in waterproof walls and floors must be fabricated with minimum 1/4" thick rectangular steel plate placed around mid-point of sleeve, continuously welded to sleeve and then place the entire/plate assembly into proper position prior to erection of walls and floors. Otherwise, provide sleeves with a minimum of three (3) lugs for anchoring.
- G. Pack voids between sleeves, piping or conduit, where located in fire or smoke rated assemblies, in accordance with UL Fire Resistance Directory.
- H. Set all sleeves prior to or during erection of walls and floors. In the event that sleeves are omitted or incorrectly located in new walls or slabs, submit a location plan and method of cutting and installing sleeves to the Design Professional for review prior to carrying out the work.
- I. If sleeves are omitted or located incorrectly, the particular Trade Contractor who is at fault, at no additional cost to the project, must engage the trade which originally installed the work, to cut and patch to the satisfaction of the Design Professional.
- J. Provide mechanical seals and insert into voids between piping and conduits that pass through floors, and which will be exposed in finished areas that have floor drains, including spaces classified as "Janitors Closets," "Toilet Rooms," and the like.
- K. Where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine, such as a masonry saw or core drill, to insure a neat hole.

# 2.11 SMOKE/FIRESTOPPING (MATERIALS)

A. Firestopping materials and systems must consist of commercially manufactured products complying with the following minimum requirements and be asbestos and PCB free:

- 1. Flame Spread Index: Twenty-five or less when tested in accordance with ASTM E 84.
- 2. Smoke Density Index: Fifty or less when tested in accordance with ASTM E 84.
- 3. Nontoxicity: Nontoxic to human beings at all stages of application and during fire conditions.
- 4. Systems shall comply with Underwriter's Laboratory Listing Requirements.
- 5. Fire Resistance:
  - a. Materials and systems used to seal penetrations in time rated assemblies must be capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E 119 time temperature fire conditions for 3 hours.
  - b. Materials must not require a rise in temperature to install or activate seal.
  - c. Materials must not contain solvents or require hazardous waste disposal.
  - d. Firestop material must not dissolve in water after curing.
- B. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Rectorshield, Inc.;
  - 2. Hilti;
  - 3. 3M;
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.
- C. Refer to general construction contract documents of these specifications.
- D. Smoke stopping materials must be approved by the authority having jurisdiction.

# PART 3 - EXECUTION

#### 3.1 METHOD OF PROCEDURE

- A. The drawings accompanying these specifications are diagrammatic and intended to cover the approximate and relative locations of the building systems.
- B. Installation, connection and interconnection of all components of these systems must be complete and made in accordance with the manufacturers' instructions and best trade practices.
- C. Erect all parts of equipment furnished at such time and in such manner as not to delay or interfere with other Trade Contractors and their work.
- D. Plug all piping, conduit and ductwork as required during construction to prevent entering of dirt.
- E. Before material is ordered or fabricated, or any work is performed, verify all calculations, sizing, measurements, including lines, grades, pipes, and conduit elevations at the building, as applicable, and be responsible for the correctness thereof. No extra compensation will be

allowed on account of differences between actual dimensions, routing and measurements and those indicated in the Contract Documents. Any discrepancies discovered must be submitted to the Engineer for consideration before proceeding with the work.

- F. Lay out work and be responsible for the establishment of heights, grades, and the like, for all interior and exterior equipment and systems as applicable, including piping, drains, fixtures, conduit, and the like, included in Contract Documents, in strict accordance with the intent expressed thereby; and all the physical conditions to be met at the building and finished grade, and be responsible for accuracy thereof. The establishment of the location of all work must be performed in consideration of the finished work. In case of conflict, equipment and/or materials must be relocated without cost to the Project, as directed by the Design Professional, regardless of which equipment was installed first. Refer to Article, "Coordination Drawings", in Part 1 of this section.
- G. Cooperate with other Trade Contractors for the proper securing and anchoring of all work included within these specifications. Use extraordinary care in the erection and installation of all equipment and materials to avoid marring surfaces of the work of other Trade Contractors, as each Trade Contractor will be held financially responsible for all such injury caused by the lack of precaution and due to negligence on the part of the Trade Contractor's work force.
- H. Do not run pipe or conduit in any concrete slab three inches (3") or less in thickness. Do not place any pipe or conduit in any slab where the outside diameter of the pipe or conduit is more than one-quarter the thickness of the slab. The sweep of pipe or conduit elbows emerging through concrete slabs must not create any hazard or obstructions.
- I. All piping, conduit and other materials and equipment shown to be mounted below ceilings are to be kept as close to ceiling areas as possible unless otherwise noted.
- J. Install and arrange all equipment, such as junction boxes, and the like, which will be concealed in construction, to be fully accessible for adjustment, service and maintenance. Furnish access doors where required for installation under the General Construction Contract, where applicable. Otherwise, furnish and install all required access doors.

# 3.2 **PROTECTION OF WORK**

- A. Provide all piping, equipment, materials and accessories having polished or plated surfaces, machined finishes or unpainted surfaces with a thick coat of a neutral protection grease and carefully cover with thick cloth or heavy building paper held securely in place to protect the finish against damage during the entire period of construction. Protect equipment by the use of canvas tarps, vinyl sheeting or similar materials held securely in place.
- B. Seal all openings in pipes, fittings, conduit and all other materials to exclude dirt, sand, and other foreign materials.
- C. Exercise every precaution to exclude dust, dirt and all other foreign materials from switchgear rooms, transformers, and all mechanical equipment rooms during construction. Rooms and equipment contained therein must be swept and vacuum cleaned at regular intervals. All relays, meters and electrical equipment containing electrical components must be protected

with heavy paper held in place with approved mastic tape to exclude fine dust and particles. Install and maintain sufficient electric heaters in equipment rooms and transformer compartments to keep equipment dry during construction.

# 3.3 CUTTING AND PATCHING

- A. New Construction:
  - 1. Perform cutting and patching in accordance with Division 01.
  - 2. Provide and set all sleeves, inserts and other items required for the installation of the electrical work, and take responsibility for their final and permanent locations.
- B. For existing construction:
  - 1. All Trade Contractors are responsible for their own cutting and patching.

#### 3.4 SUPPORTS

- A. Except where noted otherwise in the specifications and shown on drawings, provide all materials, including, but not limited to, equipment supports, supplies and labor necessary as required to adequately support, brace and strengthen new and/or existing equipment and materials installed under/or affected by the electrical work.
- B. The design, materials, fabrication and erection of structural steel supports must conform to "Specification for Design, Fabrication and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction, "Code of Standard Practice for Steel Buildings and Bridges". Welding, where required, must conform to "Code of Arc and Gas Welding in Building Construction" of the American Welding Society.

#### 3.5 PAINTING AND FINISHING

- A. All painting, generally, will be provided by the General Construction Trade Contractor, where applicable, except where specifically noted otherwise in the Electrical Specifications. Otherwise, all Trade Contractors are responsible for their own painting and finishing.
- B. Equipment and material furnished with factory enamel finish will not be painted unless finish has been damaged, in which case the equipment or material must be refinished by the Trade Contractor who furnished it, to the satisfaction of the Design Professional.

### 3.6 LUBRICATION

- A. Provide proper and necessary lubrication of any items of operating, rotating or moving equipment which is furnished, installed or which must operate as part of the electrical system.
- B. When an item of operating equipment is furnished and installed by a Trade Contractor, it will be that Trade Contractor's responsibility to accomplish the lubrication.

- C. When an item of operating equipment is furnished by one Trade Contractor and installed by another, it is the responsibility of the Trade Contractor furnishing the equipment to apply the lubricants.
- D. All rotating or moving equipment must be lubricated prior to energizing and operating the equipment. Should the Trade Contractor responsible for the lubrication fail to apply lubricants prior to initial start-up and the equipment is damaged as a result of that Trade Contractor's negligence, that Trade Contractor is required to provide all corrective action necessary including replacement, if required, for the proper operation of equipment.
- E. Lubrication must be accomplished in the manner prescribed or recommended by the manufacturer of the specific item. For motor driven equipment this precaution of lubrication will apply individually to the driver and the driven component.
- F. The lubricants must be of the type, grade, specification and manufacture as prescribed or recommended by the manufacturer of the specific equipment item.
- G. Extend lubrication fittings where required to allow maintenance personnel to lubricate the equipment easily and efficiently.
- H. The Trade Contractor who supplies any item of rotating equipment will have the responsibility of securing written instructions on the lubricating procedure and must furnish not less than one year's supply of all necessary lubricants properly identified so they can be replaced.
- I. Any moving or rotating equipment furnished by the Owner that is to be installed, reused and/or serviced must also be lubricated. Except where noted otherwise in the Contract Documents, the Trade Contractor installing, reusing and/or servicing all such equipment is responsible for the proper lubrication thereof, including obtaining proper lubricating instructions from the various manufacturers involved, furnishing and applying the necessary lubricants and leaving the Owner with a one (1) year supply of lubricant.

# 3.7 ELECTRICAL TRADE COORDINATION

- A. Equipment by other Trade Contractors shall be furnished with electrical current characteristics as shown on electrical drawings and specifications.
- B. The nameplate voltage of all motors furnished with mechanical equipment must be within the range of the voltage shown for use with the motor as the upper limit, and 5% less than this voltage as the lower limit.
- C. Other Trade Contractors must furnish all motors, motor starters, specialty motor controllers, float and pressure switches, temperature control, other special automatic controls as indicated in the Contract Documents for all equipment furnished and/or installed under their contract except where noted otherwise.
- D. All electrical equipment furnished by other Trade Contractors must be as recommended by the equipment manufacturers, in accordance with the Electrical Specifications for similar items,

and of such type as to work properly with automatic temperature control sequences where required.

- E. The Electrical Trade Contractor must provide all push-buttons, safety switches for motors, and wiring from starters to motors and install all starters furnished to him by other Trade Contractors unless otherwise indicated in the Contract Documents.
- F. Where controllers and/or starters are furnished as an integral part of any equipment, the Trade Contractor supplying the equipment must furnish complete wiring between controllers, starters and motors.
- G. The Electrical Trade Contractor must provide disconnect switches for all equipment furnished and/or installed by other Trade Contractors, except where such switches are an integral part of equipment.
- H. Other Trade Contractors must set all motors and furnish, set and pipe as necessary, float switches, temperature control and other special automatic temperature controls.
- I. Other Trade Contractors must provide all power and control wiring required by their respective section of the specification. The Electrical Trade Contractor must provide all other wiring required for the completion of the work of the other Trade Contractors.
- J. Other Trade Contractors must furnish the Electrical Trade Contractor with complete wiring diagrams as required.
- K. Any electrical work performed by the other Trade Contractors must be performed in accordance with the requirements of the ELECTRICAL Section of these specifications.
- L. For additional coordination items, refer to Article 2.2, "Submittals".

# 3.8 EQUIPMENT IDENTIFICATION

- A. Manufacturer: Subject to compliance with the requirements, provide products by one of the following:
  - 1. Seton Nameplate Corporation;
  - 2. Marking Services, Inc.;
  - 3. Brady Worldwide;
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.
- B. Identify all equipment as to nature, service and purpose by means of permanently attached plastic nameplates having ½" high letters, dull black outside and white core. Nameplates of approved size, beveled edges and engraved through black to white core. Nameplates shall indicate equipment identification names and numbers as approved by the Owner.

### 3.9 ABANDONMENT, REMOVAL AND RELOCATION

- A. Perform all abandonment, removal and relocation work required for completion of electrical systems.
- B. Removals shown on drawings are a general indication only, and may not necessarily indicate the full extent of removals which may be required to complete this work.
- C. Where existing partitions, walls, ceilings and floors are to be removed, all piping, conduits, materials and equipment attached or fastened thereto or within, as applicable, must be carefully removed.
- D. Where work under this contract interferes with the existing construction, ductwork, piping, conduit or equipment, remove all such materials and route new work to clear the obstruction. Provide additional piping, conduits, and material of the same design and quality if the piping and/or conduit is to be continued in use.
- E. Disconnect and remove all accessible piping, conduit, ductwork, materials, fixtures and equipment not required in the new systems. Plug all outlets at the main or riser connection.
- F. Removed materials not desired by the Owner and not to be reset and not specified nor indicated to be reused, become the property of the Electrical Trade Contractor and must be promptly removed from site.
- G. All demolition work is subject to the direction and approval of the Design Professional and must be performed in such manner as not to interfere with the normal operation of the building.
- H. Relocate existing utilities and/or equipment that must remain to maintain operation of building or parts of building outside the work area.
- I. Equipment Pad Removal:
  - 1. Remove all concrete pads and equipment support structure material related to the Electrical Trade, not indicated or specified for reuse. Remove concrete pads to one (1) inch below adjacent concrete floor surface. Exterior slabs shall be broken and removed as waste materials.
  - 2. Cut-off reinforcement and anchor bolts at or below level of pad removal.
    - a. Resurface area level with adjacent concrete floor surface using a heavy duty aggregate concrete topping consisting of Portland cement Type I or Type III conforming to ASTM C150 with aggregate graded by weight to pass sieves as follows:

Fine (Thin Coat)	or	Course (Heavy Coat)
3/8" 100% No. 4 95-100% No. 8 65-80%		1/2" 100% 3/8" 30-50% No. 4 0-15%

No. 16	45-65%	No. 8 0-	5%
No. 30	25-45%	No. 100	0-5%

- b. Topping mix must contain a high range water reducing admixture (super plasticizer) ASTM C494, Type F or Type G.
- c. Coat surface with epoxy bonding agent prior to application of concrete topping.
- d. Produce a heavy duty concrete topping with the following characteristics:

Compressive Strength	5000 psi at 28 days
Slump	8" maximum
Water to Cement Ratio	0.44.

# 3.10 SMOKE AND FIRESTOPPING (METHODS)

- A. Installation of materials must be performed by applicator/installers qualified, trained and approved by the manufacturer of the materials, and be installed in accordance with ASTM E 814.
- B. Install smoke and firestopping at locations required, shown, or specified in accordance with applicable codes, manufacturer's written instructions, and test report, applying to the specific trade equipment as applicable. Cutting and patching of construction and providing sleeves, where required, is shown on drawings or specified in other sections.
  - 1. Filling of Voids: Smoke and firestopping materials must completely fill void spaces regardless of geometric configuration, subject to tolerances established by the manufacturer. Smoke and firestopping for filling voids in floors in which the smallest dimension of the void is 4 in. or more must support the same load as the floor is designed to support or must be protected by a permanent barrier to prevent loading or traffic in the smoke or firestopped areas.
  - 2. Electrical Cables or Conduits: Smoke and firestopping at penetrations of electrical cables or conduits must comply with the requirements of NFPA No. 70.
  - 3. Where smoke and firestopping of penetrations in floors, walls and partitions that will be exposed in completed construction, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and provide escutcheons or other trim.
  - 4. Schedule the installation and required inspection of smoke and firestops for penetrations that will be concealed in completed construction prior to erection of floors, walls, and partitions that would permanently conceal the penetrations.
- C. All areas of smoke and firestopping installation must be accessible until inspection by the applicable code authorities.

#### 3.11 INITIAL APPLICATION FOR PAYMENT

- A. Provide the following prior to submitting the initial application for payment:
  - 1. Copy of the Electrical Trade Contractor's and Sub-Contractors' licenses for the state in which the work is being performed.

- 2. Resumes for the designated Project Manager and Project Foreman.
- 3. List of independent agencies who will be engaged by the Electrical Trade Contractor to perform tests, provide certifications, conduct inspections, etc. as required by Contract Documents.
- B. The initial application for payment will not be processed until the items above are submitted.

# 3.12 FINAL APPLICATION FOR PAYMENT

- A. Provide the following prior to submitting the final application for payment:
  - 1. Refer to general construction contract documents of these specifications.
  - 2. Equipment Start-Up Reports for each piece of electrical equipment.
  - 3. Electrical Inspection Agency's written report.
  - 4. Operating and Maintenance Manuals and Data.
  - 5. Electrical systems and equipment warranties.
  - 6. Electrical System Commissioning Report.
  - 7. Electrical Trade Contractor's Punch List of incomplete work items with reason why each work item is not complete and anticipated schedule for completion. Submit at least one week prior to Engineer's final Construction Observation Report site visit.
  - 8. Electrical Trade Contractor's notarized certification letter.
  - 9. As-built drawings as described in Part 1 of this specification section.
- B. Final payment is contingent upon completion of all items listed above.

# 3.13 ADDITIONAL ELECTRICAL TRADE CONTRACTOR PAID FEES AND EXPENSES

- A. As a material part of the Electrical Trade Contractor's Agreement to complete the work of this Contract, the Electrical Trade Contractor agrees to reimburse Gillan & Hartmann, Inc. ("Design Professional") for the below listed extra engineering work under the following conditions:
  - 1. Design Professional's hourly billing rate shall be \$150.00 per hour for all related office hours, travel time and as applicable, on-site time;
  - 2. Electrical Trade Contractor's request(s) for substitution;
    - a. When such requests for substitution are not the result of a bonafide delivery problem or design related problem, and;
    - b. When such requests do not address items of equipment for which the specifications list the basis of design with at least one comparable product, and;
    - c. The Electrical Trade Contractor's request(s) for substitution must be submitted in writing, and;
    - d. The Electrical Trade Contractor agrees to compensate the Design Professional \$1,500.00 (per diem) for the review of each proposed substitution;
    - e. The Electrical Trade Contractor shall render written acceptance of the Design Professional's extra charges, and;
    - f. Any balance not paid will be deducted from contractors final payment.

- 3. Extra Design Professional work created by the Electrical Trade Contractor's multiple submissions of a single material or piece of equipment;
  - a. The Design Professional's basic services include two reviews for each piece of equipment or material submittal. The Design Professional's first review takes place at the initial Electrical Trade Contractor's submission of that submittal. The Design Professional's second review takes place when the Design Professional requires a resubmission of that submittal.
  - b. If the Design Professional's third review of a particular submittal is required for reasons due to the Electrical Trade Contractor, the Trade Contractor agrees to compensate the Design Professional \$1,500.00 for each submittal review.
  - c. Any unpaid balance due will be deducted from the Trade Contractors final payment.
- 4. Extra work created by the Electrical Trade Contractor resolution of substantial completion and final completion construction observation reports and project closeout documentation:
  - a. The Design Professional's basic services rendered to the Owner include periodic visits to the site and providing written list of items (Construction Observation Report) requiring the Electrical Trade Contractor's attention, reporting and resolution;
  - b. The Electrical Trade Contractor shall provide written feedback and prompt resolution of Construction Observation Items including a written schedule for the Electrical Trade Contractor's completion of these Items followed by a written confirmation of closure;
  - c. The contract documents specify the Electrical Trade Contractor's requirements including written notification of substantial completion, including contractor's prepared punch list of items to be completed;
  - d. The Design Professional services include: the preparation of one (1) substantial completion/final completion observation report; and one (1) review of the Electrical Trade Contractor's resolution of the substantial completion/final completion observation report.
  - e. The Electrical Trade Contractor agrees to compensate the Design Professional \$1,500.00 (per diem) for the preparation of additional substantial completion/final completion reports as required to achieve final completion.
  - f. Any unpaid balance will be deducted from the contractor's final payment.

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ELECTRICAL CONTRACTOR'S											
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		Print Name:									
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By execut	ing this Transmittal Cov	er, the Contractor agrees and accepts that:									
<ul> <li>Subn appro be pr</li> </ul>	nittals without the HVAC/Plu oval will not be reviewed. Ini ovided at the Contractor's exp	mbing/Fire Protection and Electrical Contractor's signed stamp of tialed approval stamps are not acceptable. All resulting resubmittals will pense.									
<ul> <li>The I of the the C comp</li> </ul>	Engineer's recommendation o e equipment proposed by the Contract Documents. By furni pliance with all of the following	f acceptance ("Furnish as Submitted", "Furnish as Noted Below", etc.) Contractor is conditional upon the Contractor fulfilling all obligations of ishing the proposed equipment, the Contractor acknowledges ng:									
•	The Contractor has completed related shop drawings, related	field layout and planning of proposed equipment and has coordinated all other trades involved in Project Construction, and all space requirements.									
°	<ul> <li>The Contractor has examined all shop drawings prior to submission. The Contractor forwards all shop drawings with a signed approved stamp, signifying the following:</li> </ul>										
	<ol> <li>All field measurement data have been verifie</li> </ol>	<li>s, field construction criteria, materials, dimensions, catalog numbers and similar d.</li>									
	<ol> <li>The Architect/Engineer has been notified of all site conditions which affect the work, and which require design resolution beyond resolution by Trade contractors' Field Decisions;</li> <li>All interventions being an engineering backs of the back and a site of the back of the b</li></ol>										
	<ol> <li>All items herein are approved by the Contractor, and have been coordinated and checked with or applicable submittals, and contract requirements;</li> </ol>										
	<ol> <li>Submission is clearly provided with the prop</li> </ol>	marked to indicate which manufacturer's options are provided and which are not posed equipment.									
0	<ul> <li>Any and all exceptions requested by the HVAC/Plumbing/Fire Protection and Electrical Contractors have been included in written form. All exceptions, deletions, and additions that vary from the Contract Documents have been specifically annotated and initialed. Failing to provide the initialed annotations for all deletions and additions, the Contractor accepts the condition that the Contract Documents will govern, and will be used to resolve disputes.</li> </ul>										
0	All Engineer's notes regarding	this submission must be incorporated into the Project.									
°	5 The Engineer's review is limited to comparison of the technical performance of the Contractor's proposed equipment to the specified technical performance.										
•	Equipment submittal is either the Basis-of-Design, or a comparable product to the Basis-of-Design.										
°	A Comparable Product must n but not limited to: material of design; and performance requi Project Design.	neet or exceed all the salient characteristics and standards necessary including, manufacture; independent testing agency certifications; quality; function; ired to meet the Owner's needs and meet the objectives of the Professional's									
0	Extension of Contract Time at failure to provide submittals o multiple resubmittals, and/or f Refer to EQUIPMENT VARL of the Specifications.	nd/or claim for delay are not acceptable as created by the Trade Contractor's n a timely basis to permit the processing work of the Professional, including failure to provide submittals that are comparable to the Basis of Design Product. ATIONS AND SUBSTITUTIONS article in the General Requirements Section									
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END OF SECTION 260010
## SECTION 260050 - BASIC ELECTRICAL MATERIALS AND METHODS

## 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. Supporting devices for electrical components.
  - 2. Electrical identification.
  - 3. Electrical demolition.
  - 4. Cutting and patching for electrical construction.
  - 5. Touchup painting.

#### 1.3 SUBMITTALS

- A. Product Data: For electricity-metering equipment.
- B. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity- metering equipment.
- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

## 1.4 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, and marked for intended use.
- B. Comply with NFPA 70.

## 1.5 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

- 1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
- C. Coordinate electrical service connections to components furnished by utility companies.
  - 1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
  - 2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.
- D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 08 Section "Access Doors."
- E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.
- G. Electrical devices and boxes are indicated on Drawings in approximate locations unless dimensioned. Adjust box or device location up to 10 feet, if required to accommodate intended purpose or owner request, with no additional cost to contract.

## PART 2 - PRODUCTS

## 2.1 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch-(14-mm-) diameter slotted holes at a maximum of 2 inches (50 mm) o.c., in webs.
  - 1. Channel Thickness: Selected to suit structural loading.
  - 2. Fittings and Accessories: Products of the same manufacturer as channel supports.
- D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded Cclamps with retainers, ceiling trapeze hangers, and wall brackets.
- E. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

- F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- G. Expansion Anchors: Carbon-steel wedge or sleeve type.
- H. Toggle Bolts: All-steel springhead type.
- I. Powder-Driven Threaded Studs: Heat-treated steel.

# 2.2 ELECTRICAL IDENTIFICATION

- A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
- B. Raceway and Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway and cable size.
  - 1. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is over laminated with a clear, weather- and chemical-resistant coating.
  - 2. Color: Black letters on orange background.
  - 3. Legend: Indicates voltage.
- C. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick (25 mm wide by 0.08 mm thick).
- D. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:
  - 1. Not less than 6 inches wide by 4 mils thick (150 mm wide by 0.102 mm thick).
  - 2. Compounded for permanent direct-burial service.
  - 3. Embedded continuous metallic strip or core.
  - 4. Printed legend that indicates type of underground line.
- E. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- F. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.
- G. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch (1.6-mm) minimum thickness for signs up to 20 sq. in. (129 sq. cm) and 1/8-inch (3.2-mm) minimum thickness for larger sizes. Engraved legend in black letters on white background.
- H. Interior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.
  Preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.

- I. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weatherresistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm), galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4inch (6-mm) grommets in corners for mounting.
- J. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

## 2.3 CONCRETE BASES

- A. Concrete Forms and Reinforcement Materials: As specified in Division 03 Section "Cast-in-Place Concrete."
- B. Concrete: 3000-psi (20.7-MPa), 28-day compressive strength as specified in Division 03 Section "Cast-in-Place Concrete."

## 2.4 TOUCHUP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

## PART 3 - EXECUTION

#### 3.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

#### 3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
- B. Dry Locations: Steel materials.

- C. Support Clamps for PVC Raceways: Click-type clamp system.
- D. Selection of Supports: Comply with manufacturer's written instructions.
- E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb (90-kg) design load.

## 3.3 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
- E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- F. Install 1/4-inch- (6-mm-) diameter or larger threaded steel hanger rods, unless otherwise indicated.
- G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch (38-mm) and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.
- H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- I. Simultaneously install vertical conductor supports with conductors.
- J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches (610 mm) from the box.
- K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
- L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless coredrilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-

rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

- M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
  - 1. Wood: Fasten with wood screws or screw-type nails.
  - 2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
  - 3. New Concrete: Concrete inserts with machine screws and bolts.
  - 4. Existing Concrete: Expansion bolts.
  - 5. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
  - 6. Steel: Welded threaded studs or spring-tension clamps on steel.
    - a. Field Welding: Comply with AWS D1.1.
  - 7. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
  - 8. Light Steel: Sheet-metal screws.
  - 9. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

#### 3.4 IDENTIFICATION MATERIALS AND DEVICES

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- C. Self-Adhesive Identification Products: Clean surfaces before applying.
- D. Identify raceways and cables with color banding as follows:
  - 1. Bands: Pretensioned, snap-around, colored plastic sleeves or colored adhesive marking tape. Make each color band 2 inches (51 mm) wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
  - Band Locations: At changes in direction, at penetrations of walls and floors, at 50- foot (15-m) maximum intervals in straight runs, and at 25-foot (8-m) maximum intervals in congested areas.
  - 3. Apply the following colors to the systems listed below:
    - a. Fire Alarm System: Red.
    - b. Fire-Suppression Supervisory and Control System: Red and yellow.

- c. Combined Fire Alarm and Security System: Red and blue.
- d. Security System: Blue and yellow.
- e. Mechanical and Electrical Supervisory System: Green and blue.
- f. Telecommunication System: Green and yellow.
- E. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
- F. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches (150 to 200 mm) below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches (400 mm), overall, use a single line marker.
- G. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
  - 1. Phase A: Black.
  - 2. Phase B: Red.
  - 3. Phase C: Blue.
  - 4. Neutral: White.
  - 5. Ground: Green.
- H. Color-code 480/277-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
  - 1. Phase A: Yellow.
  - 2. Phase B: Brown.
  - 3. Phase C: Orange.
  - 4. Neutral: White with a colored stripe or gray.
  - 5. Ground: Green.
- I. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed 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.
- J. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch- (9-mm-) high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.
- K. Equipment Identification Labels: Engraved plastic laminate. 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 indicated, provide a single line of text with 1/2-inch- (13-mm-) high lettering on 1-1/2-inch- (38-mm-) high label; where two lines of text are

required, use labels 2 inches (50 mm) high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment using mechanical fasteners:

- 1. Panelboards, electrical cabinets, and enclosures.
- 2. Access doors and panels for concealed electrical items.
- 3. Electrical switchboards.
- 4. Disconnect switches.
- 5. Enclosed circuit breakers.
- 6. Motor starters.
- 7. Push-button stations
- 8. Contactors.
- 9. Control devices.
- 10. Transformers...
- L. Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Where width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches (400 mm) overall, use a single line marker.

#### 3.5 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Firestopping."

#### 3.6 DEMOLITION

- A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
- B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
- C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches (50 mm) below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- D. Remove demolished material from Project site.
- E. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

#### 3.7 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

#### 3.8 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:
  - 1. Raceways.
  - 2. Building wire and connectors.
  - 3. Supporting devices for electrical components.
  - 4. Electrical identification.
  - 5. Electricity-metering components.
  - 6. Concrete bases.
  - 7. Electrical demolition.
  - 8. Cutting and patching for electrical construction.
  - 9. Touchup painting.

#### 3.9 REFINISHING AND TOUCHUP PAINT

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 09 Section "Painting."
  - 1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
  - 2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
  - 3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

#### 3.10 CLEANING AND PROTECTION

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

#### END OF SECTION 260050

## SECTION 260442 - PANELBOARDS

## 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. Lighting and appliance branch-circuit panelboards.

#### 1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. RFI: Radio-frequency interference.
- D. RMS: Root mean square.
- E. SPDT: Single pole, double throw.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of panelboard, overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
  - 1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
    - a. Interior Enclosure types and details for types other than NEMA 250, Type 1.
    - b. Exterior enclosures shall be Nema 3R weatherproof
    - c. Bus configuration, current, and voltage ratings.

- d. Short-circuit current rating of panelboards and overcurrent protective devices.
- e. UL listing for series rating of installed devices.
- f. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
- 2. Wiring Diagrams: Power, signal, and control wiring.
- C. Qualification Data: For testing agency.
- D. Field quality-control test reports including the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- E. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
- F. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Sections include the following:
  - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
  - 2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

## 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of panelboards and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NEMA PB 1.
- E. Comply with NFPA 70

## 1.6 **PROJECT CONDITIONS**

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
  - 1. Ambient Temperature: Not exceeding 104 deg F.
  - 2. Altitude: Not exceeding 6600 feet.
- B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
  - 1. Ambient temperatures within limits specified.
  - 2. Altitude not exceeding 6600 feet.
- C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
  - 1. Notify Owner no fewer than two days in advance of proposed interruption of electrical service.
  - 2. Do not proceed with interruption of electrical service without Owner's written permission.

## 1.7 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

#### 1.8 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. Keys: Six spares for each type of panelboard cabinet lock.

# 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. Panelboards, Overcurrent Protective Devices, Contactors, and Accessories:
    - a. Eaton Corporation; Cutler-Hammer Products.
    - b. General Electric Co.; Electrical Distribution & Protection Div.
    - c. Siemens Energy & Automation, Inc.

- d. Square D;
- e. Or approved equal in accordance with the project substitution provisions of the contract.

# 2.2 MANUFACTURED UNITS

- A. Enclosures: Surface-mounted cabinets. NEMA PB 1, Type 1.
  - 1. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
  - 2. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
  - 3. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
  - 4. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
  - 5. Directory Card: With transparent protective cover, mounted in metal frame, inside panelboard door.
- B. Phase and Ground Buses:
  - 1. Material: Hard-drawn copper, 98 percent conductivity.
  - 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.
  - 3. Neutral Bus: Neutral bus rated 100 percent of phase bus.
- C. Conductor Connectors: Suitable for use with conductor material.
  - 1. Main and Neutral Lugs: Mechanical type.
  - 2. Ground Lugs and Bus Configured Terminators: Compression type.
  - 3. Feed-Through Lugs: Mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
- D. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

## 2.3 PANELBOARDS SHORT-CIRCUIT RATING

A. Fully rated to interrupt symmetrical short-circuit current available at terminals.

## 2.4 POWER PANELBOARDS

- A. Doors: Secured with tumbler lock; keyed alike.
- B. Mains Overcurrent Protective Devices: Circuit breaker.
- C. Branch Overcurrent Protective Devices:

- 1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- 2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers Plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

## 2.5 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- B. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

# 2.6 OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker: UL 489, with interrupting capacity to meet available fault currents.
  - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
  - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with frontmounted, field-adjustable trip setting.
  - 3. Electronic trip-unit for circuit breakers larger than 800 A; shall have RMS sensing; field-replaceable rating plug; and with the following field-adjustable settings:
    - a. Instantaneous trip.
    - b. Ground-fault pickup level, time delay, and I2t response.
  - 4. GFCI Circuit Breakers: Single- and two-pole configurations with 30-mA trip sensitivity.
- B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.
  - 1. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
  - 2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
  - 3. Multipole units enclosed in a single housing or factory-assembled to operate as a single unit.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Mount top of trim 74 inches above finished floor unless otherwise indicated.

- C. Mount plumb and rigid without distortion of box.
- D. Install overcurrent protective devices.
  - 1. Set field-adjustable, circuit-breaker trip ranges.
- E. Retrofit existing panels in accordance with new panels, provide new interiors and doors
- F. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

# 3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

#### 3.3 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding."
- B. Connect wiring according to Division 26 Section "Conductors and Cables."

#### 3.4 FIELD QUALITY CONTROL

- A. Perform for acceptance tests as follows:
  - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
  - 2. Test continuity of each circuit.
- B. Perform the following field tests and inspections and prepare test reports:
  - 1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Exclude electrical test in 7.5. Exclude the following NETA ATS (1999) items for breakers with trip settings of 400A or less: 7.6.1.1.2.5; 7.6.1.1.2.6; 7.6.1.1.2.7; 7.6.1.1.2.8; 7.6.1.1.2.9. Certify compliance with test parameters.
  - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

- C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
  - 1. Measure as direct during period of normal system loading.
  - 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
  - 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
  - 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.
- D. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scanning of each panelboard. Remove panel fronts so joints and connections are accessible to portable scanner.
  - 1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
  - 2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
  - 3. Record of Infrared Scanning: Prepare a certified report that identifies panelboards checked and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

## 3.5 CLEANING

A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

## END OF SECTION 260442

# SECTION 260519 – LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and section 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Copper building wire rated 600 V or less.
  - 2. Metal-clad cable, Type MC, rated 600 V or less.
  - 3. Connectors, splices, and terminations rated 600 V and less.

#### 1.3 DEFINITIONS

A. VFC: Variable-frequency controller.

#### 1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

## 1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA.
  - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

# PART 2 - PRODUCTS

## 2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Standards:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors. Minimum size #12 AWG .
- D. Conductor Insulation:
  - 1. Type THHN and Type THWN-2: Comply with UL 83.
  - 2. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
- E. Shield:
  - 1. Type TC-ER: Cable designed for use with VFCs, with oversized crosslinked polyethylene insulation, dual spirally wrapped copper tape shields and three bare symmetrically applied ground wires, and sunlight- and oil-resistant outer PVC jacket.

#### 2.2 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. Standards:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. Comply with UL 1569.
  - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- D. Ground Conductor: Insulated.
- E. Conductor Insulation:

- 1. Type TFN/THHN/THWN-2: Comply with UL 83.
- F. Armor: Steel, interlocked.

## 2.3 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
  - 1. Material: Copper.
  - 2. Termination: Compression.

# PART 3 - EXECUTION

## 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
- C. VFC Output Circuits Cable: Extra-flexible stranded for all sizes.
- D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

# 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN/THWN-2, single conductors in raceway.
- B. Feeders: Type THHN/THWN-2, single conductors in raceway.
- C. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.
- D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway. Type MC cable can be provided in lieu of wires in raceways where acceptable to applicable codes and to the Authority Having Jurisdiction.
- E. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.
- F. VFC Output Circuits: Type TC-ER cable with dual tape shield.

## 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use 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.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 260050 "Basic Electrical Materials and Methods."

## 3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torquetightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

## 3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260050 "Basic Electrical Materials and Methods."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

## 3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260050 "Basic for Electrical Materials and Methods."

## 3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

## 3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
  - 2. Perform each of the following visual and electrical tests:
    - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
    - b. Test bolted connections for high resistance using one of the following:
      - 1) A low-resistance ohmmeter.
      - 2) Calibrated torque wrench.
      - 3) Thermographic survey.
    - c. Inspect compression-applied connectors for correct cable match and indentation.
    - d. Inspect for correct identification.
    - e. Inspect cable jacket and condition.
    - f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
    - g. Continuity test on each conductor and cable.
    - h. Uniform resistance of parallel conductors.
  - 3. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
    - a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    - b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
  - 4. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.
- B. Cables will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports to record the following:

- 1. Procedures used.
- 2. Results that comply with requirements.
- 3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

## END OF SECTION 260519

## SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

#### 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 grounding and bonding systems and equipment.
- B. Section includes grounding and bonding systems and equipment, plus the following special applications:
  - 1. Underground distribution grounding.

## **1.3 ACTION SUBMITTALS**

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

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency and testing agency's field supervisor.
- B. Field quality-control reports.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified in "Operation and Maintenance Data," include the following:
    - a. Instructions for periodic testing and inspection of grounding features at test wells, and ground rings based on NFPA 70B.
      - 1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
      - 2) Include recommended testing intervals.

## 1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by NETA.

# PART 2 - PRODUCTS

## 2.1 SYSTEM DESCRIPTION

- 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.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

## 2.2 CONDUCTORS

- A. Insulated Conductors: Tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.
  - 3. Tinned Conductors: ASTM B 33.
  - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
  - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 incheswide and 1/16 inchthick.
  - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 incheswide and 1/16 inch thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inchesin cross section, with 9/32-inchholes spaced 1-1/8 inchesapart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

## 2.3 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

## 2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel, 3/4 inch by 10 feet.

# PART 3 - EXECUTION

## 3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.
  - 1. Bury at least 24 inchesbelow grade.
- C. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
  - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
  - 4. Connections to Structural Steel: Welded connectors.

#### 3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.
  - 3. Receptacle circuits.
  - 4. Single-phase motor and appliance branch circuits.
  - 5. Three-phase motor and appliance branch circuits.
  - 6. Flexible raceway runs.
  - 7. Armored and metal-clad cable runs.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to ductmounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- D. Metallic Fences: Comply with requirements of IEEE C2.
  - 1. Grounding Conductor: Bare, tinned copper, not less than No. 8 AWG.

- 2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
- 3. Barbed Wire: Strands shall be bonded to the grounding conductor.

## 3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
  - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
  - 2. Use exothermic welds for all below-grade connections.
  - 3. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Test Wells: Ground rod driven through drilled hole in bottom of handhole.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
  - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
  - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
  - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
  - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
  - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

- F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.
- G. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.
- H. Exterior Equipment Ground Ring shown on the drawings: Install a grounding conductor, electrically connected to each piece of equipment and to the ground rods extending around the perimeter of the equipment.
  - 1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps.
  - 2. Bury ground ring not less than 24 inches below finished grade.
- I. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; use a minimum of 20 feetof bare copper conductor not smaller than shown on the single line diagram.
  - 1. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.
- J. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
  - 1. Use electroplated or hot-tin-coated materials to ensure 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.

## 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections with the assistance of a factory-authorized service representative.
- D. Tests and Inspections:

- 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
- 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
- 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
  - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
  - b. Perform tests by fall-of-potential method according to IEEE 81.
- 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- E. Grounding system will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.
- G. Report measured ground resistances that exceed the following values:
  - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
  - 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
- H. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

#### END OF SECTION 260526

# SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

## 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.

## 1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. EPDM: Ethylene-propylene-diene terpolymer rubber.
- D. FMC: Flexible metal conduit.
- E. IMC: Intermediate metal conduit.
- F. LFMC: Liquidtight flexible metal conduit.
- G. LFNC: Liquidtight flexible nonmetallic conduit.
- H. NBR: Acrylonitrile-butadiene rubber.
- I. RNC: Rigid nonmetallic conduit.

#### 1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Custom enclosures and cabinets.
  - 2. For handholes and boxes for underground wiring, including the following:

- a. Duct entry provisions, including locations and duct sizes.
- b. Frame and cover design.
- c. Grounding details.
- d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
- e. Joint details.

## 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, and marked for intended use.
- B. Comply with NFPA 70.

## 1.6 COORDINATION

- A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension systems with other construction that penetrates ceilings or is supported by them, including but not limited to lighting fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
- B. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

## PART 2 - PRODUCTS

## 2.1 METAL CONDUITS AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Allied Tube & Conduit; a Tyco International Ltd. Co.
  - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
  - 3. Electri-Flex Co.
  - 4. O-Z Gedney; a unit of General Signal.
  - 5. Wheatland Tube Company.
  - 6. Or approved equal in accordance with the project substitution provisions of the contract.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. IMC: ANSI C80.6.
- D. EMT: ANSI C80.3.
- E. FMC: Zinc-coated steel.

- F. LFMC: Flexible steel conduit with PVC jacket.
- G. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB
  1; listed for type and size raceway with which used, and for application and environment in which installed.
  - 1. Fittings for EMT: Steel, set-screw or compression type.
- H. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

## 2.2 NONMETALLIC CONDUIT AND TUBING

- 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. AFC Cable Systems, Inc.
  - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
  - 3. Arnco Corporation.
  - 4. CANTEX Inc.
  - 5. CertainTeed Corp.; Pipe & Plastics Group.
  - 6. Condux International, Inc.
  - 7. ElecSYS, Inc.
  - 8. Electri-Flex Co.
  - 9. Lamson & Sessions; Carlon Electrical Products.
  - 10. Manhattan/CDT/Cole-Flex.
  - 11. RACO; a Hubbell Company.
  - 12. Thomas & Betts Corporation.
  - 13. Or approved equal in accordance with the project substitution provisions of the contract.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- C. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.

#### 2.3 METAL WIREWAYS

- 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. Cooper B-Line, Inc.
  - 2. Hoffman.
  - 3. Square D; Schneider Electric.
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.

- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type, unless otherwise indicated.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, holddown straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Hinged type Screw-cover type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

## 2.4 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.
  - 1. 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:
    - a. Thomas & Betts Corporation.
    - b. Walker Systems, Inc.; Wiremold Company (The).
    - c. Wiremold Company (The); Electrical Sales Division.
    - d. Or approved equal in accordance with the project substitution provisions of the contract.

## 2.5 BOXES, ENCLOSURES, AND CABINETS

- 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. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
  - 2. EGS/Appleton Electric.
  - 3. Erickson Electrical Equipment Company.
  - 4. Hoffman.
  - 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
  - 6. O-Z/Gedney; a unit of General Signal.
  - 7. RACO; a Hubbell Company.
  - 8. Robroy Industries, Inc.; Enclosure Division.
  - 9. Scott Fetzer Co.; Adalet Division.
  - 10. Spring City Electrical Manufacturing Company.
  - 11. Thomas & Betts Corporation.
  - 12. Walker Systems, Inc.; Wiremold Company (The).
  - 13. Woodhead, Daniel Company; Woodhead Industries, inc. Subsidiary.
  - 14. Or approved equal in accordance with the project substitution provisions of the contract.

- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Cast-Metal Access Pull, and Junction Boxes: NEMA FB 1, galvanized, cast-iron, unless otherwise indicated.
- F. Hinged-Cover Enclosures: NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- G. Cabinets:
  - 1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
  - 2. Hinged door in front cover with flush latch and concealed hinge.
  - 3. Key latch to match panelboards.
  - 4. Metal barriers to separate wiring of different systems and voltage.
  - 5. Accessory feet where required for freestanding equipment.

## 2.6 SLEEVES FOR RACEWAYS

- 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 with minimum 0.052-or-0.138 inch thickness as indicated and of length to suit application.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Through-Penetration Firestop Systems."

## 2.7 SLEEVE SEALS

- 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. Advance Products & Systems, Inc.
  - 2. Calpico, Inc.
  - 3. Metraflex Co.
  - 4. Pipeline Seal and Insulator, Inc.
  - 5. Or approved equal in accordance with the project substitution provisions of the contract.

- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
  - 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
  - 2. Pressure Plates: Stainless steel. Include two for each sealing element.
  - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

# PART 3 - EXECUTION

# 3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
  - 1. Exposed Conduit: Rigid steel conduit or IMC.
  - 2. Concealed Conduit, Aboveground: Rigid steel conduit or IMC.
  - 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
  - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Comply with the following indoor applications, unless otherwise indicated:
  - 1. Exposed: EMT
  - 2. Exposed and Subject to Sever Physical Damage: Rigid steel conduit, IMC. Includes raceways in the following locations:
    - a. Loading dock.
    - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    - c. Mechanical rooms.
  - 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.and whips to systems furniture.
  - 5. Damp or Wet Locations: IMC.
  - 6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
  - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated.

## 3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Basic Electrical Materials and Methods."
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
  - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
  - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  - 3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above floor.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- L. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
  - 1. 1-inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
  - 2. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

- M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where otherwise required by NFPA 70.
- N. Flexible Conduit Connections: Use a maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
  - 1. Use LFMC in damp or wet locations.
- O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

# 3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
  - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 02 Section "Earthwork" for pipe less than 6 inches in nominal diameter.
  - 2. Install backfill as specified in Division 02 Section "Earthwork."
  - 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 02 Section "Earthwork."
  - 4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
  - 5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
    - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3-inches of concrete.
    - b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60-inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
## 3.4 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Through-Penetration Firestop Systems."
- 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. Rectangular Sleeve minimum Metal Thickness:
  - 1. For sleeve cross-section rectangle perimeter less than 50-inches and no side greater than 16-inches, thickness shall be 0.052 inch.
  - 2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than. 16-inches, thickness shall be 0.138 inch.
- E. 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.
- F. Cut sleeves to length for mounting flush with both surfaces of walls.
- G. Extend sleeves installed in floors 2-inches above finished floor level.
- H. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway unless sleeve seal is to be installed or unless seismic criteria require different clearance.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 07 Section "Through-Penetration Firestop Systems."
- L. Roof-Penetrations Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
- M. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- N. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between raceway and sleeve for installing mechanical sleeve seals.

## 3.5 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground, exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

# 3.6 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Through-Penetration Firestop Systems."

## 3.7 **PROTECTION**

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

#### END OF SECTION 260533

### **SECTION 260923**

## DIGITAL PROGRAMMED LIGHTING CONTROL 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.
- B. This Section includes requirements for a complete and fully functional Digital Programmed Lighting Control system in each of the rooms shown on the drawings using the components included on the drawing E001 Symbol Legend using the Wattstopper Legrand part numbers listed as the Basis of Design.
- C. Digital programmed lighting control devices are to be provided in rooms not using analog lighting control devices which are Electrical Rooms, Mechanical Rooms, Elevator Shaft, Data Closets, and the Attic Stairway.
- D. The final design of the automatic lighting control systems in each room shall provide the number of components to comply with the "Automatic Lighting Control General Notes" listed on drawing E001 and the code requirements of ANSI/ASHRAE/IES Standard 90.1-2013 Section 9 Lighting. Provide all required additional components, parts, accessories, power supplies, and wiring as required to utilize these components for a complete digital automatic lighting control system in each room that these components are shown on the drawings. The quantity of devices shown on the drawing is diagrammatic and not indicative of the actual quantity of devices and wiring required by the manufacturer's final design for these systems.
- E. Provide all required computer software, software licenses, and computer cable/adapter equipment required to program the lighting control equipment located in each room. Install the control software on a computer furnished by the Owner and provide all required control devices and software required to connect the computer to the lighting control equipment and provide the software and control training described in this specification.

# 1.2 DEFINITIONS

- A. Zone: Defines areas subject to primary or secondary daylight harvesting.
- B. Channel: Defines areas independently controlled in the same room.

#### 1.3 SUMMARY

- A. Provide time-based, occupancy sensor-based, and manually switched on/off and manual dimming lighting control according to the Sequence of Operations listed in the drawing E001 Automatic Lighting Control General Notes.
- B. The Contractor shall obtain the services of a factory authorized representative to conduct a minimum two hour pre-construction and pre-installation coordination and training session to instruct the Contractor on how all of the lighting control devices provided as a part of this project (both analog and digital lighting control devices) are required to installed, wired, programmed, and tested.
- C. The Contractor shall obtain the services of a factory authorized representative to conduct a post installation test of each of the lighting control devices provided as a part of this project (analog and digital lighting control devices) as a part of this project. After testing is complete and it has been confirmed that the devices fulfill the requirements listed in the General Section of this specification, the Contractor shall provide a written report to the Architect and Engineer confirming the results of the tests with a written description of any necessary corrective actions.

# 1.4 SUBMITTALS

- A. Provide Product Datasheets for each of the programmed light control devices that includes general device descriptions, dimensions, electrical specifications, wiring details, and nomenclature.
- B. Provide Riser Diagrams for each of the rooms (Typical drawings are acceptable for classrooms and offices) illustrating how the lighting control system components in each room are wired. The diagrams shall include 120V or 277V (as applicable) power wiring, dimming control wiring, and the low voltage control wiring. The diagrams shall also include the sequence of operation to confirm that the devices will provide the sequence of operations listed in the drawing E001 Automatic Lighting Control General Notes.
- C. Provide computer generated floorplan for each of the rooms (Typical drawings are acceptable for classrooms and offices) showing the quantities and locations of the programmed lighting control devices. Coordinate the locations of the devices with the locations of all ceiling mounted electrical devices and HVAC diffusers to insure the locations comply with the manufacturer's recommendations for the minimum spacing from HVAC diffusers.
- D. Provide a detailed narrative description of the controls systems operation for each room type (with or without daylight harvesting, with one or more channels, with occupancy sensors or vacancy sensors, etc.)
- E. Provide a written schedule with proposed dates for the pre-construction conference.
- F. Hardware and software Operation Manuals.

# 1.5 PROJECT CLOSEOUT DOCUMENTATION

- A. Provide a hardcopy factory published manual that includes:
  - 1. Warranty.
  - 2. Technical Support Contact.
  - 3. Provide copies of device cut sheets, riser diagrams, and floorplans that were submitted as shop drawings.
  - 4. Provide hardware and software Operation Manuals.
  - 5. Additional electronic copy of the product cut sheets and operations manual on a computer zip drive.

# 1.6 QUALITY ASSURANCE

- A. In high humidity or cold environments, the sensors shall be coated and rated for condensing humidity and -40 deg F operation.
- B. All applicable products must be UL/CUL listed or listed by other acceptable national testing organization.

# 1.7 **PROJECT CONDITIONS**

- A. Only install equipment after the following site conditions are maintained:
  - 1. Ambient Temperature 14 to 105 deg F.
  - 2. Relative Humidity less than 90% non-condensing.
- B. Standard electrical enclosures are permanently installed.
- C. Equipment is protected from dust, debris, and moisture.

# 1.8 WARRANTY

A. Five (5) year 100% parts replacement.

# 1.9 MAINTENANCE AND SUSTAINABILITY

- A. Provide new parts, software, upgrades, and/or replacements available for a minimum of 5 years available to the end user.
- B. Provide free telephone technical support.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Basis of design: Acuity Brands.
- B. Acceptable Manufacturers who meet specification requirements.
  - 1. Leviton.
  - 2. Aquity.
  - 3. Or equal as approved by the Professional.

## 2.2 INDIVIDUAL DEVICE SPECIFICATIONS

- A. Zone Controllers: Wattstopper LMZC-301 Series or equal.
- B. Room Controllers: Wattstopper LMRC-210 (0-10 volt dimming) Series or equal.
- C. Split Receptacle Plug Load Controllers: Wattstopper LMPL-101 Series or equal.
- D. Dual Technology Occupancy Sensors (Used in Offices and Classrooms) : Wattstopper LMDC-100 Series or equal.
- E. Vacancy Sensors: Wattstopper LMDC-100 Series programmed to provide vacancy sensor input to the required Room Controller.
- F. Dimming Wall Switches: LMDM-101 Series or equal.
- G. Non-Dimming Manual On/Off Switches to work with the dimming Wall Switches in a three-way application: Wattstopper switch compatible with the LMDM-101 Series.

# 2.3 STARTUP AND SUPPORT FEATURES

- A. To facilitate start-up, all devices daisy-chained together by control/communication cable shall automatically be grouped together into a functional lighting control zone.
- B. All lighting control zones shall be able to function according to default settings once adequate power is applied and before any system software is installed.
- C. Once Software is installed, system shall be able to auto-discover all system devices without requiring any commissioning.
- D. All devices within the network shall be able to have their firmware upgraded remotely and without being physically uninstalled for purposes of upgrading functionality at a later date.
- E. All sensor devices shall have the ability to detect improper communication wiring and blink a signal LED in a specific cadence as to alert installation/startup personnel.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.
- B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 SENSOR INSTALLATION

- A. Comply with NECA 1.
- B. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- C. Install and aim sensors in locations to achieve not less than 90-percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

## 3.3 WIRING INSTALLATION

- A. Comply with NECA 1.
- B. Wiring Method: Comply with Section 16120.
- C. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and non-power limited conductors according to conductor manufacturer's written instructions.
- D. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

# 3.4 IDENTIFICATION

- A. Identify components and power and control wiring according to Section 16010.
  - 1. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

# 3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. In addition to the requirements listed in Part 1.3 of this specification, perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Lighting control devices will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

# 3.6 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
  - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
  - 2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
  - 3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

# 3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train the Owner's maintenance personnel (provide a minimum of three hours of training time to demonstrate the programming software provided as a part of this project) to adjust, operate, and maintain lighting control devices.

#### END OF SECTION 260923

#### **SECTION 260924**

#### ANALOG LIGHTING CONTROL 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 requirements for lighting control devices used in areas that do not incorporate daylight harvesting. For daylight harvesting areas, see specification 260943. This section includes requirements for:
  - 1. Electronic time switches.
  - 2. Outdoor photoelectric switches, solid state, flexible mounting.
  - 3. Emergency shunt relay.
  - 4. Conductors and cables.

## 1.3 **SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Show installation details for all of the devices included in this specification.
  - 2. Interconnection diagrams showing field-installed wiring.
  - 3. Include diagrams for power, signal, and control wiring.
- C. Field quality-control reports.
- D. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.

### 1.4 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:

- a. Faulty operation of lighting control devices.
- 2. Warranty Period: Two year(s) from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 **ELECTRONIC TIME SWITCHES**

- A. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.
  - 1. Listed and labeled as defined in NFPA 70 and marked for intended location and application.
  - 2. Contact Configuration: SPST.
  - 3. Contact Rating: 20-A ballast load, 120-/240.
  - 4. Programs:
    - a. Eight on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
  - 5. Astronomic Time: All channels.
  - 6. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

# 2.2 OUTDOOR PHOTOELECTRIC SWITCHES, SOLID STATE, FLEXIBLE MOUNTING

- A. Description: Solid state, with SPST dry contacts rated for 1000 W incandescent, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A, and compatible with ballasts and LED lamps.
  - 1. Listed and labeled as defined in NFPA 70, by NRTL, and marked for intended location and application.
  - 2. Time Delay: Fifteen-second minimum, to prevent false operation.
  - 3. Surge Protection: Metal-oxide varistor.
  - 4. Mounting: Twist lock complies with ANSI C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.
  - 5. Failure Mode: Luminaire stays ON.
  - 6. Plenum rated.

# 2.3 EMERGENCY TRANSFER RELAY TYPE "R3"

A. Basis of design: Bodine GTD20A with 277V coil rating.

## 2.4 EMERGENCY SHUNT RELAY TYPE "R1"

- A. Description: NC, electrically held relay, arranged for wiring in parallel with manual switching contacts; complying with UL 924.
  - 1. Coil Rating: 277 V.

## PART 3 - EXECUTION

## 3.1 **EXAMINATION**

- A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.
- B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 **INSTALLATION OF SENSORS**

- A. Comply with NECA 1.
- B. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- C. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

#### 3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Lighting control devices will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

# 3.4 **DEMONSTRATION**

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 260924

# SECTION 262726 - 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. Section Includes:
  - 1. Straight-blade convenience, hospital-grade, and tamper-resistant receptacles.
  - 2. GFCI receptacles.
  - 3. Toggle switches.
  - 4. Wall plates.

#### 1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. RFI: Radio-frequency interference.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.

# 1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

## 1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packinglabel warnings and instruction manuals that include labeling conditions.

# PART 2 - PRODUCTS

## 2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
  - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
  - 2. Devices shall comply with the requirements in this Section.
- D. Devices for Owner-Furnished Equipment:
  - 1. Receptacles: Match plug configurations.
  - 2. Cord and Plug Sets: Match equipment requirements.
- E. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

#### 2.2 STRAIGHT-BLADE RECEPTACLES

- A. Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498.
- B. Tamper-Resistant Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

#### 2.3 GFCI RECEPTACLES

- A. General Description:
  - 1. 125 V, 20 A, straight blade, feed-through type. Tamper Resistant.
  - 2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
  - 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

## 2.4 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- B. Switches, 120/277 V, 20 A:
- C. Key-Operated Switches: 120/277 V, 20 A.
  - 1. Description: Single pole, with factory-supplied key in lieu of switch handle.

## 2.5 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
  - 1. Plate-Securing Screws: Metal with head color to match plate finish.
  - 2. Material for Finished Spaces: 0.035-inchthick, satin-finished, Type 302 stainless steel with color as specified by the Architect.
  - 3. Material for Unfinished Spaces: Galvanized steel.
  - 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weatherresistant, die-cast aluminum with lockable cover.

#### 2.6 FINISHES

- A. Device Color:
  - 1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
  - 2. Wiring Devices Connected to Emergency Power System: Red.
- B. Wall Plate Color: For plastic covers, match device color.

# PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
  - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.

- 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
- 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
- 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
  - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
  - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
  - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
  - 4. Existing Conductors:
    - a. Cut back and pigtail, or replace all damaged conductors.
    - b. Straighten conductors that remain and remove corrosion and foreign matter.
    - c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation:
  - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
  - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
  - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
  - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
  - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
  - 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
  - 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
  - 8. Tighten unused terminal screws on the device.
  - 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
  - 1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
  - 2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Dimmers:
  - 1. Install dimmers within terms of their listing.
  - 2. Verify that dimmers used for lighting control are suitable for the light fixtures they will be connected to.
  - 3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.
- I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

## **3.2 GFCI RECEPTACLES**

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required. Provide in use covers for exterior outlets

#### 3.3 IDENTIFICATION

- A. Comply with specifications for "Identification for Electrical Systems" in Section 260050.
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

### 3.4 FIELD QUALITY CONTROL

- A. Tests for Convenience Receptacles:
  - 1. Line Voltage: Acceptable range is 105 to 132 V.
  - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
  - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
  - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
  - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
  - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- B. Wiring device will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 262726

#### **SECTION 262816**

#### **ENCLOSED SWITCHES AND CIRCUIT BREAKERS**

### PART 1- GENERAL

#### 1.1 STIPULATIONS

A. The specification sections "General Conditions of Construction Contract", "Special Conditions" and "Division 01 – General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

# 1.2 RELATED DOCUMENTS

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

# 1.3 SUMMARY

- A. This Section includes the following individually mounted, enclosed switches and circuit breakers:
  - 1. Fusible switches.
  - 2. Nonfusible switches.
  - 3. Molded-case circuit breakers for installation in existing panels.
  - 4. Enclosures.

#### 1.4 **DEFINITIONS**

- A. GD: General duty.
- B. GFCI: Ground-fault circuit interrupter.
- C. HD: Heavy duty.
- D. RMS: Root mean square.
- E. SPDT: Single pole, double throw.

#### 1.5 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical

data on features, performance, electrical characteristics, ratings, and finishes.

- 1. Enclosure types and details for types other than NEMA 250, Type 1.
- 2. Current and voltage ratings.
- 3. Short-circuit current rating.
- 4. UL listing for series rating of installed devices.
- 5. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in the applicable Division 01 Sections. Include the following:
  - 1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
  - 2. Time-current curves, including selectable ranges for each type of circuit breaker.

# 1.6 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, and marked for intended use.
- B. Comply with NFPA 70.

# 1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

## 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 Manufacturers: Subject to compliance with requirements.

## 2.2 FUSIBLE AND NONFUSIBLE SWITCHES

- A. Available Manufacturers:
  - 1. Eaton Corporation; Cutler-Hammer Products.
  - 2. Square D/Group Schneider.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Or equal as approved by the Professional.
- B. Fusible Switch, 600 A and Smaller: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- C. Non-fusible Switch, 600 A and Smaller: NEMA KS 1, Type HD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- D. Accessories:
  - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
  - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded, and bonded; and labeled for copper and aluminum neutral conductors.

# 2.3 MOLDED-CASE CIRCUIT BREAKERS FOR INSTALLATION IN EXISTING PANELS AND FOR INDIVIDUAL ENCLOSURES

- A. Manufacturers: Provide units compatible with the existing panel in which installed.
- B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.
  - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
  - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with frontmounted, field-adjustable trip setting.
  - 3. Lugs: Mechanical style with compression lug kits suitable for number, size, trip ratings, and conductor material.
  - 4. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

# 2.4 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
  - 1. Outdoor Locations: NEMA 250, Type 3R.
  - 2. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches.
- B. Mount individual wall-mounting switches with tops at uniform height, unless otherwise indicated.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

#### 3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as required in specification section "Basic Electrical Materials and Methods."
- B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate as required in specification section "Basic Electrical Materials and Methods."

## 3.4 FIELD QUALITY CONTROL

- A. Prepare for acceptance testing as follows:
  - 1. Inspect mechanical and electrical connections.
  - 2. Verify switch and relay type and labeling verification.
  - 3. Verify rating of installed fuses.
  - 4. Inspect proper installation of type, size, quantity, and arrangement of mounting or anchorage devices complying with manufacturer's certification.
- B. Perform the following field tests and inspections and prepare test reports:
  - 1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Exclude electrical test in 7.5. Exclude the following NETA ATS (1999) items for breakers with trip settings of 400A or less: 7.6.1.1.2.5; 7.6.1.1.2.6; 7.6.1.1.2.7; 7.6.1.1.2.8; 7.6.1.1.2.9.

Certify compliance with test parameters.

- 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- 3. Infrared Scanning:
  - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Open or remove doors or panels so connections are accessible to portable scanner.
  - b. Instruments, Equipment and Reports:
    - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    - Prepare a certified report that identifies enclosed switches and circuit breakers included and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

## 3.5 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

#### 3.6 CLEANING

- A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.
- B. Inspect exposed surfaces and repair damaged finishes.

#### END OF SECTION 262816

## **SECTION 265119 - LED INTERIOR LIGHTING**

## PART 1 – GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings, general provisions of the Contract, include General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Interior lighting fixtures.
  - 2. Exit signs.
  - 3. Lighting fixture supports.
  - 4. Where possible, provide DLC listed light fixtures for this project of a type equal to the fixtures listed in this specification.

#### 1.3 **DEFINITIONS**

- A. CRI: Color-rendering index.
- B. CU: Coefficient of utilization.
- C. LER: Luminaire efficacy rating.
- D. Luminaire: Complete lighting fixture, including ballast housing if provided.
- E. RCR: Room cavity ratio.

# 1.4 SUBMITTALS

- A. LED Light Fixture Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
  - 1. Physical description of lighting fixture including dimensions.
  - 2. Include confirmation that the light fixtures being provided are either DLC listed or confirmation that a DLC listed fixture is not obtainable for the light fixture.
  - 3. The shop drawing shall include the "L70 Rating" for each light fixture, indicating compliance with a minimum L70 of 50,000 hours.

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- 4. The shop drawing shall indicate, for exterior light fixtures, a rated ambient temperature of 15 degrees-C or lower.
- 5. The shop drawing shall include photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing and Calculation Guides, of each lighting fixture type. The adjustment factors shall be for fixtures identical to those required for this project.
- 6. The shop drawing shall include, for each fixture, the rated driver current, indicating compliance with a maximum value of 2 mA.
- 7. The shop drawing shall indicate the minimum delivered lumens indicating compliance with the minimum value listed in the light fixture schedule.
- 8. The shop drawing shall indicate the CRI = Color Rendering Index of the light fixture indicating compliance with the CRI value listed in the light fixture schedule.
- 9. Shop drawings that do not include each of the above light fixture ratings shall be rejected.
- B. Field quality-control test reports.
- C. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
- D. Warranties: Special warranties specified in this Section.

# 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, and marked for intended use.
- B. Comply with NFPA 70.

# 1.6 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.
- B. The light fixture catalog number indicated on the project documents is to establish the intent of design but does not necessarily include all required accessories and hardware for a complete installation. Prior to shop drawing submission and fixture purchase, coordinate the final requirements for each light fixture with ceiling construction and finish types as required by the Professional and/or the Institution. Coordination to include but not be limited to: ceiling type; supporting methods & hardware; trim; accessories; fixture

finish and color. Submission of bid indicates inclusion of all material and installation as required by these coordination requirements.

## 1.7 WARRANTY

A. LED light fixtures provided as a part of this project shall be provided with a 5 year warranty.

## 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 Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
  - 2. Basis-of-Design Product: The design for each lighting fixture is based on the product named in the Lighting Fixture Schedule shown on drawings. Subject to compliance with requirements, provide either the named product, a comparable product by one of the other manufacturers specified, or an approved equal.

# 2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit re-lamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during re-lamping and when secured in operating position.
- E. Reflecting surfaces shall have 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.
- F. Plastic Diffusers, Covers, and Globes:
  - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
    - a. Lens Thickness: At least 0.125 inch minimum unless different thickness is indicated.
    - b. UV stabilized.
  - 2. Glass: Annealed crystal glass, unless otherwise indicated.

# 2.2 EXIT SIGNS

- A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
  - 1. Lamps for AC Operation: LEDs, 70,000 hours minimum rated lamp life.
  - 2. See drawing light fixture schedule for requirements.

# 2.3 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- B. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- C. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.
- D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

# 2.4 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

A. Fixtures Characteristics: As shown on Lighting Fixture Schedule.

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## 2.5 LED LIGHT FIXTURES

- A. LED light fixtures provided as a part of this project shall have a minimum L70 rated life of 50,000 hours. The shop drawing submitted for these fixtures shall include this information.
- B. The maximum driver current for each fixture shall not exceed 2mA.
- C. The power factor of the load for each light fixture shall not exceed a value to cause a 60% loaded 277V light fixture branch circuit to have a power factor less than 0.85.
- D. The LED fixtures shall be provided with the special warranty listed in this specification.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Use grid as the primary support element.
  - 1. Install a minimum of four ceiling support system rods or wires for each fixture from the building structure to tabs on the light fixture located not more than 6 inches from the light fixture corner. The wire or rod shall have a breaking strength of the weight of the fixture at a safety factor of 3.
  - 2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
  - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
- C. Suspended Lighting Fixture Support:
  - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
  - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
  - 3. Continuous Rows: Use tubing or stem for wiring at one point and

tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

- D. Adjust aimable lighting fixtures to provide required light intensities.
- E. Connect wiring according to Division 26 Section "Low Voltage Electrical Power Conductors and Cables."

# 3.2 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 265119

## SECTION 271513 - COMMUNICATIONS COPPER HORIZONTAL CABLING

## 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. Category 6a twisted pair cable.
  - 2. Twisted pair cable hardware, including plugs and jacks.
  - 3. Cable management systems.
  - 4. Patch Panels.
  - 5. Cabling identification products.
  - 6. Grounding provisions for twisted pair cable.
  - 7. Source quality control requirements for twisted pair cable.

#### 1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. Jack: Also commonly called an "outlet," it is the fixed, female connector.
- C. Plug: Also commonly called a "connector," it is the removable, male telecommunications connector.
- D. RCDD: Registered Communications Distribution Designer.
- E. UTP: Unscreened (unshielded) twisted pair.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product.
- B. Twisted pair cable testing plan.
- C. Provide results of test data to the Design professional after testing has been completed.
- D. Product Certificates: For each type of product.

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- E. Source quality-control reports.
- F. Field quality-control reports.

# 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
  - 1. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
  - 1. Test each pair of twisted pair cable for open and short circuits.

# 1.7 **PROJECT CONDITIONS**

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

#### 1.8 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with the Institution's telecommunications and LAN equipment and service suppliers.

# PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with and be tested to confirm that transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.
- B. Grounding: Comply with TIA-607-B.

# 2.2 GENERAL CABLE CHARACTERISTICS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and NFPA 70 for the following types:

- 1. Communications Plenum Rated: Type CMP complying with UL 1685.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 450 or less.
- C. RoHS compliant.

# 2.3 CATEGORY 6a TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6a cable at frequencies up to 500MHz.
- B. Standard: Comply with TIA-568-C.2 for Category 6a cables.
- C. Conductors: 100-ohm, 23 AWG solid copper.
- D. Shielding/Screening: Unshielded twisted pairs (UTP).
- E. Cable Rating: Plenum.
- F. Jacket: Blue thermoplastic.

# 2.4 TWISTED PAIR CABLE HARDWARE

- A. Description: Hardware designed to connect, splice, and terminate twisted pair copper communications cable.
- B. General Requirements for Twisted Pair Cable Hardware:
  - 1. Comply with the performance requirements of Category 6a.
  - 2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
  - 3. Cables shall be terminated with connecting hardware of same category or higher.
- C. Source Limitations: Obtain twisted pair cable hardware from single source from single manufacturer.
- D. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.
  - 1. Features:
    - a. Universal T568A and T568B wiring labels.
    - b. Labeling areas adjacent to conductors.
    - c. Replaceable connectors.

- d. 24 or 48 ports.
- 2. Construction: 16-gauge steel and mountable on 19-inchequipment racks.
- 3. Number of Jacks per Field: One for each four-pair cable indicated, plus spares and blank positions adequate to suit specified expansion criteria.
- E. Plugs and Plug Assemblies:
  - 1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
  - 2. Standard: Comply with TIA-568-C.2.
  - 3. Marked to indicate transmission performance.
- F. Jacks and Jack Assemblies:
  - 1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
  - 2. Designed to snap-in to a patch panel or faceplate.
  - 3. Standard: Comply with TIA-568-C.2.
  - 4. Marked to indicate transmission performance.
- G. Faceplate:
  - 1. Faceplates designed to mount to single gang wall boxes.
  - 2. Plastic Faceplate: High-impact plastic. Coordinate color with Section 262726 "Wiring Devices."
  - 3. For use with snap-in jacks accommodating any combination of twisted pair, optical fiber, and coaxial work area cords.
    - a. Flush mounting jacks, positioning the cord at a 45-degree angle.
- H. Legend:
  - 1. Machine printed, in the field, using adhesive-tape label.
  - 2. Snap-in, clear-label covers and machine-printed paper inserts.

# 2.5 IDENTIFICATION PRODUCTS

A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

# 2.6 GROUNDING

- A. Comply with requirements in Section 260526.
- B. Comply with TIA-607-B.

## 2.7 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test cables on reels according to TIA-568-C.1.
- C. Factory test twisted pair cables according to TIA-568-C.2.
- D. Cable will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports and submit them to the engineer as a shop drawing submittal.

#### PART 3 - EXECUTION

#### 3.1 WIRING METHODS

- A. Wiring Method: Install cables in raceways (where concealed in walls), except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, where unenclosed wiring method may be used. Conceal raceway and cables, except in unfinished spaces.
  - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Provide J-Hooks and cable support rings for cable support between the rooms and the electrical/data closet above dropped ceilings that are rated for use with Cat-6a cables.
- D. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
  Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

#### 3.2 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

- A. Comply with NECA 1 and NECA/BICSI 568.
- B. General Requirements for Cabling:
  - 1. Provide patch panels for termination in the electrical/data closet.
  - 2. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
  - 3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.

- 4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
- 5. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
- 6. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section. Use lacing bars and distribution spools.
- 7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation, and replace it with new cable.
- 8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
- 9. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
- 10. Pulling Cable: Comply with BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Pulling and Installing Cable" Section. Monitor cable pull tensions.
- C. Open-Cable Installation:
  - 1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
  - 2. Suspend twisted pair cabling, not in a wireway or pathway, a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
  - 3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- D. Separation from EMI Sources:
  - 1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.
  - 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
    - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
    - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
    - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
  - 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
    - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
    - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
    - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.

- 4. Separation between communications cables in grounded metallic raceways, power lines, and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
- 5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
- 6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

# 3.3 FIRESTOPPING

- A. Comply with the "Penetration Firestopping" requirements in the specifications.
- B. Comply with TIA-569-D, Annex A, "Firestopping."
- C. Comply with "Firestopping Systems" Article in BISCI's "Telecommunications Distribution Methods Manual."

# 3.4 GROUNDING

- A. Install grounding according to the "Grounding, Bonding, and Electrical Protection" chapter in BICSI's "Telecommunications Distribution Methods Manual."
- B. Comply with TIA-607-B and NECA/BICSI-607.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall, allowing at least a 2-inch clearance behind the grounding bus bar. Connect grounding bus bar to suitable electrical building ground, using a minimum No. 4 AWG grounding electrode conductor.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than a No.6 AWG equipment grounding conductor.

# 3.5 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA-606-B.
- B. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- C. Cable and Wire Identification:
- 1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
- 2. Each wire connected to building-mounted devices is not required to be numbered at the device if wire color is consistent with associated wire connected and numbered within panel or cabinet.
- 3. Label each terminal strip, and screw terminal in each cabinet, rack, or panel.
  - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group, extended from a panel or cabinet to a building-mounted device, with the name and number of a particular device.
  - b. Label each unit and field within distribution racks and frames.
- 4. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and -connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- D. Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-B requirements for the following:
  - 1. Cables use flexible vinyl or polyester that flexes as cables are bent.

### 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections with the assistance of a factory-authorized service representative.
- D. Tests and Inspections:
  - 1. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568-C.1.
  - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
  - 3. Test twisted pair cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
    - a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords

and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

- E. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similarly to Table 10.1 in BICSI's "Telecommunications Distribution Methods Manual," or shall be transferred from the instrument to the computer, saved as text files, printed, and submitted.
- F. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
- G. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- H. Prepare test and inspection reports.

### END OF SECTION 271513

### SECTION 283111 - DIGITAL ADDRESSABLE FIRE ALARM

### PART 1 - GENERAL

#### 1.1 STIPULATIONS

A. The specification sections "General Conditions", "Special Requirements", and "General Requirements" form a part of this Section by this reference thereto and shall have the same force and effect as if printed herewith in full.

#### 1.2 RELATED DOCUMENTS

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

### 1.3 SUMMARY

- A. This Section includes requirements for the modification and expansion of the Notifier fire alarm system at Clayton J Davenport Elementary and Primary School.
- B. The project includes requirements to add, notification devices, smoke and heat detectors, carbon monoxide detectors door holders. See drawing E001 for contact information for the fire alarm Vendor who service the fire alarm systems at each of these schools.
- C. All equipment and material provided for the fire alarm system shall be fully compatible with the existing Notifier fire alarm system.
- D. Coordinate with the equipment manufacturer's representatives listed on the drawings to obtain the requirements to modify the existing systems as shown on the drawings and include in the bid price the costs to provide all required equipment, labor and material to modify the existing systems as shown on the drawings.
- E. For each additional fire alarm system control panel or power supply panel provided by the Fire Alarm Vendor (beyond what is shown on the drawings) for their final system design, provide an additional 120V branch circuits (2#12, 1#12G, 3/4"C) to the nearest 120/208V panelboard and a smoke detector above each panel.
- F. After the modifications to the existing fire alarm system are complete, test the system in compliance with the requirements of the Local Authority Having Jurisdiction and NFPA 72.

#### 1.4 **DEFINITIONS**

A. FACP: Fire alarm control panel.

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- B. LED: Light-emitting diode.
- C. NICET: National Institute for Certification in Engineering Technologies.
- D. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

### 1.5 SYSTEM DESCRIPTION

- A. The Notifier System is a fully address able fire alarm system.
- B. Provide Modifications and additions as required to the existing Notifier System fire alarm panel to add and remove the devices shown on the drawing.

### 1.6 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
  - 1. Provide shop drawings that are signed and sealed by a Professional Engineer with the following qualifications:
    - a. Trained and certified by manufacturer in fire alarm system design.
    - b. Fire alarm certified by NICET, minimum Level III.
  - 2. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
  - 3. Device Address List: Coordinate with final system programming.
  - 4. System riser diagram with device addresses, conduit sizes, and cable and wire types and sizes.
  - 5. Wiring Diagrams: Power, signal, and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code.
  - 6. Batteries: Size calculations.
  - 7. Ductwork Coordination Drawings: Plans, sections, and elevations of ducts, drawn to scale and coordinating the installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, the detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
- C. Qualification Data: For Installer.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For fire alarm system to include in emergency, operation, and maintenance manuals. Comply with NFPA 72, Appendix A, recommendations for

Institution's manual. Include abbreviated operating instructions for mounting at the FACP.

- F. The shop drawings shall include signed and sealed (By a NICET qualified Professional Engineer) floorplans (showing the locations of all devices), wiring diagrams, riser diagrams, battery calculations and all additional NFPA 72 requirements.
- G. Submittals to Authorities Having Jurisdiction: In addition to distribution requirements for submittals specified in Division 01 Section "Submittals," make an identical submittal to authorities having jurisdiction (Pennsylvania Department of Labor & Industry) for review and approval prior to submission to the Professional. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations. Resubmit if required to make clarifications or revisions to obtain approval. On receipt of comments from authorities having jurisdiction, submit them to Professional for review.
- H. Documentation:
  - 1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Institution, Professional, and authorities having jurisdiction.
  - 2. Record of Completion Documents: Provide the "Permanent Records" according to NFPA 72 to Institution, Professional, and authorities having jurisdiction. Format of the written sequence of operation shall be the optional input/output matrix.
    - a. Hard copies on paper to Institution, Professional, and authorities having jurisdiction.

### 1.7 QUALITY CONTROL

- A. Installer Qualifications: Personnel certified by NICET as Fire Alarm Level II.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

#### 1.8 **PROJECT CONDITIONS**

- A. Interruption of Existing Fire Alarm Service: Do not interrupt fire alarm service to facilities occupied by Institution or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
  - 1. Notify District no fewer than five days in advance of proposed interruption of fire alarm service.
  - 2. Do not proceed with interruption of fire alarm service without District's written permission.

#### **1.9 SEQUENCING AND SCHEDULING**

A. Existing Fire Alarm Equipment: Maintain fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is

accepted. Remove labels from new equipment when put into service and label existing fire alarm equipment "NOT IN SERVICE" until removed from the building.

B. Equipment Removal: After acceptance of the new fire alarm system, remove existing disconnected fire alarm equipment.

## PART 2 - PRODUCTS

### 2.1 EXISTING FIRE ALARM SYSTEM

A. Provide equipment that is fully compatible with the existing fire alarm system.

### 2.2 SYSTEM SMOKE DETECTORS

- A. General Description:
  - 1. UL 268 listed, operating at 24-V dc, nominal.
  - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
  - 3. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection of building wiring.
  - 4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
  - 5. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.
  - 6. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.
    - a. Rate-of-rise temperature characteristic shall be selectable at the FACP for 15 or 20 deg F per minute.
    - b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at the FACP to operate at 135 or 155 deg F.
    - c. Provide multiple levels of detection sensitivity for each sensor.
- B. Photoelectric Smoke Detectors:
  - 1. Sensor: LED or infrared light source with matching silicon-cell receiver.
  - 2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.
- C. Duct Smoke Detectors:
  - 1. Photoelectric Smoke Detectors:

- a. Sensor: LED or infrared light source with matching silicon-cell receiver.
- b. Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.
- 2. UL 268A listed, operating at 24-V dc, nominal.
- 3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
- 4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. The fixed base shall be designed for mounting directly to the air duct. Provide terminals in the fixed base for connection to building wiring.
  - a. Weatherproof Duct Housing Enclosure: UL listed for use with the supplied detector. The enclosure shall comply with NEMA 250 requirements for Type 4X.
- 5. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.
- 6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status. Provide remote status and alarm indicator and test station where indicated.
- 7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.
- 8. Each sensor shall have multiple levels of detection sensitivity.
- 9. Sampling Tubes: Design and dimensions as recommended by manufacturer for the specific duct size, air velocity, and installation conditions where applied.
- 10. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit & relay for smoke damper

# 2.3 HEAT DETECTORS

- A. General: UL 521 listed.
- B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or rateof-rise of temperature that exceeds 15 deg F per minute, unless otherwise indicated.
  - 1. Mounting: Adapter plate for outlet box mounting.
  - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

# 1.1 2.3 CARBON MONOXIDE DETECTORS

- A. Description: Carbon monoxide detector listed for connection to fire-alarm system.
- B. Performance Criteria:
- C. Regulatory Requirements:
  - 1. NFPA 72

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- 2. NFPA 720.
- 3. UL 2075.
- D. General Characteristics:
  - 1. Mounting: Adapter plate for outlet box mounting.
  - 2. Testable by introducing test carbon monoxide into sensing cell.
  - 3. Detector must provide alarm contacts and trouble contacts.
  - 4. Detector must send trouble alarm when nearing end-of-life, power supply problems, or internal faults.
  - 5. Locate, mount, and wire in accordance with manufacturer's written instructions.
  - 6. Provide means for addressable connection to fire-alarm system.
  - 7. Test button simulates alarm condition.

### 2.4 WIRE AND CABLE

- A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.
- B. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.
- C. Non-Power-Limited Circuits: Solid-copper conductors in raceway with 600-V rated, 75 deg C, color-coded insulation.
  - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
  - 2. Line-Voltage Circuits: No. 12 AWG, minimum.

#### PART 3 - EXECUTION

#### 3.1 EQUIPMENT INSTALLATION

- A. Connecting to Existing Equipment: Verify that existing fire alarm system is operational before making changes or connections.
  - 1. Connect new equipment to the existing control panel in the existing part of the building.
  - 2. Connect new equipment to the existing monitoring equipment at the Supervising Station.
  - 3. Expand, modify, and supplement the existing equipment as necessary to extend the existing functions to the new points. New components shall be capable of merging with the existing configuration without degrading the performance of either system.
- B. Smoke or Heat Detector Spacing:
  - 1. Smooth ceiling spacing shall not exceed 30 feet.
  - 2. Spacing of heat detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas, shall be determined according to Appendix A in NFPA 72.

- 3. Spacing of heat detectors shall be determined based on guidelines and recommendations in NFPA 72.
- C. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.
- D. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of the duct. Provide wiring to shut down fan and operate smoke dampers
- E. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
- F. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling.
- G. Device Location-Indicating Lights: Locate in public space near the device they monitor.

## 3.2 WIRING INSTALLATION

- A. Install wiring according to the following:
  - 1. NECA 1.
  - 2. TIA/EIA 568-A.
- B. Wiring Method: Install wiring in metal raceway according to Division 26.
  - 1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.
- C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- E. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.
- F. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in

close proximity to each other with a minimum 1-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.

### 3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals according to Division 26.
- B. Install instructions frame in a location visible from the FACP.
- C. Paint power-supply disconnect switch red and label "FIRE ALARM."

## 3.4 GROUNDING

A. Ground the FACP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the FACP.

## 3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
  - 1. Before requesting final approval of the installation, submit a written statement using the form for Record of Completion shown in NFPA 72.
  - 2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters. All tests shall be conducted under the direct supervision of a NICET technician certified under the Fire Alarm Systems program at Level III.
    - a. Include the existing system in tests and inspections.
  - 3. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
  - 4. Testing: Follow procedure and record results complying with requirements in NFPA 72.
  - 5. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in NFPA 70.

### 3.6 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.
- B. Follow-Up Tests and Inspections: After date of Substantial Completion, test the fire alarm

system complying with testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for three monthly, and one quarterly, periods.

## 3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Institution's maintenance personnel to adjust, operate, and maintain the fire alarm system, appliances, and devices.

# END OF SECTION 283111