

# **SPECIFICATIONS FOR**

**Delsea Regional School District  
242 Fries Mill Road  
Franklinville, NJ 08322**

**Delsea Regional High School  
New Fieldhouse Building and Toilet Room Addition  
242 Fries Mill Road  
Franklinville, NJ 08322**

**Site Engineer:**

Sciullo Engineering Services, LLC  
17 South Gordon's Alley Suite 3  
Atlantic City, NJ 08401  
(609) 300-5171

**Architect:**

Garrison Architects  
713 Creek Road  
Bellmawr, New Jersey 08031  
(856) 396-6200

**Structural Engineer:**

Orndorf and Associates  
8600 West Chester Pike  
Suite 201  
Upper Darby, PA 19083  
(610) 896-4500

**Mechanical, Electrical & Plumbing Engineer:**

Mulhern Consulting Engineers  
321 South York Road  
Hatboro, PA 19040  
(215) 293-9900

**CONFORMED SET ISSUED: January 5, 2023  
GA #20-81**





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**DELSEA REGIONAL BOARD OF EDUCATION  
DELSEA REGIONAL HS NEW FIELDHOUSE  
& TOILET ROOM ADDITION (GA# 2-81)**

**Addendum #1  
December 5, 2022**

**Bid Package Clarification and Changes**

This Addendum dated December 5, 2022 for the **Delsea Regional High School New Fieldhouse Building and Toilet Room Addition** shall be included as part of the Contract Bid Documents. This Addendum shall supplement and clarify the current Contract Bid Documents.

THIS ADDENDUM CONSISTS OF **(Three (3) PAGES)**.

**YOU MUST ACKNOWLEDGE RECEIPT OF THIS ENTIRE ADDENDUM BY SIGNING BELOW AND EMAILING BACK IMMEDIATELY TO [jangelo@garrisonarch.com](mailto:jangelo@garrisonarch.com). THIS IS MANDATORY!** If this information is unclear, please call (856) 396-6200. If you are not bidding this project, please enter company name and write "No Bid" then email this page back.

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**SIGNATURE**

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**COMPANY NAME**

1. On Drawing A2.1: For Alternate Bid #2 – Bleacher Wrap Fabric Covering; Provide the following text at the end of the note: "Proposed fabric covering shall be approx. 8'-6" in height along the back of the bleacher assembly and shall match the slope at each side. Total quantity of fabric covering is approx. 1,940 SF."
2. On Drawing S-0.1: In the Lintel Schedule, Modify lintel L3 at all overhead doors to have 3/8" galvanized bottom bent plate with 3/8" bent plate jambs and galvanized clip L3x3x1/4x6", (2) 1/2" expansion anchors to slab per architectural detail 4 & 5/A6.0. Provide flat bar anchors at 16" to walls at jambs.
3. On Drawing S-2: Plan 1/S-2: Change lintel from L1 to L1B at door 106 per architectural building elevation C on drawing C1/A4.2.
4. On Drawing S-2: Delete one lintel L1 outside HVAC/Elec room 107. Coordinate with architectural building elevation.
5. On Drawing S-2: Provide the following note at all roof plans: "Coordinate roof opening locations and provide supplemental framing as required at both roof levels".
6. On Drawing S-2: Plan 2/S-2: Provide lintel L1A at louver outside Men's Toilet 202 and Women's Toilet 203 per architectural elevation 3/A4.0.
7. On Drawing S-2: Change lintel L1 to L1A at Storage room 200 per architectural elevation 2/A4.0.

8. On Drawing S-2: Provide the following general note: “Coordinate louver openings and duct penetrations with mechanical drawings. Locate lintel assemblies accordingly”.
9. On Drawing S-3: Detail 9A/S-3: Add the following note “Coordinate number of existing and new conduits and locations in field and adjust the encasement size accordingly”.
10. On Drawing M1.1:
  - a. Mechanical Sheet Note 5: Delete all text at this note and Replace with “NOT USED”.
  - b. Mechanical Sheet Note 13: Delete the word "wide" and Replace with "wire".
  - c. Mechanical Floor Plan 1/M1.1: At the entrance door into Concession Room # 100, Add thermostat and arrow with text "TO GF-1".
11. On Drawing M2.0:
  - a. Mechanical Sheet Note 5: Delete all text at this note and Replace with “NOT USED”.
  - b. Mechanical Sheet Note 13: Delete the word "wide" and Replace with "wire".
  - c. Air Device Schedule: At SR-1, Delete the text "30x10" and Replace with “NOT USED”.
  - d. Exhaust Fan Schedule: At EF-5, Delete the text "1600" and Replace with "1700".
12. On Drawing P1.0:
  - a. Plumbing Sheet Notes: Add Note 9 to the list of sheet notes (See drawing P2.0 for full list of Plumbing Sheet Notes).
  - b. Plumbing New Work Floor Plan 2/P1.0: In Men's Toilet Room # 201, Delete "UR, P-3" and Replace with "UR, P-4".
13. On Drawing P1.2:
  - a. Plumbing New Work Floor Plan 2/P1.1: In Women's Toilet Room # 104, Delete "WC, P-1, (Typ. 7)" and Replace with "WC, P-1, (Typ. 10)".
  - b. Plumbing Sheet Notes: Add Note 37 to the list of sheet notes (See drawing P2.0 for full list of Plumbing Sheet Notes).
14. On Drawing P2.0:
  - a. Plumbing Sheet Notes: Delete all text at Notes 23 & 27 in their entirety and Replace with “NOT USED”.
  - b. Field House Building Gas Piping Riser Diagram: Add Note 16 to HWH-2 and Add Note 15 to (3) GUH(s) and (1) GF-1.



- c. Field House Building Domestic Water Piping Diagram: Add Note 20 at the HB connection below the DW/4 tag. Delete the unmarked hatch box at the floor line in the middle of this pipe run.
  - d. Field House Building Sanitary Riser diagram: Delete the text "LAV" below and slightly left of S/3 and Replace with "DF".
  - e. Field House Building Sanitary Riser diagram: Add "SK" and associated fixture symbol below the S/1 tag, to be together with the "LAV" & "3" FD" symbol.
15. On Drawing E1.1: Provide the cabinet unit heater shown at #201 men's toilet as #CUH-2A. Provide the cabinet unit heater shown at #202 women's toilet as #CUH-2B.
16. On Drawing E2.1: Provide the following note at the Solar Field Feeder: "The extent of the concrete encasement of the existing solar conduits and new spare conduits is between the edge of the track and the approximate vicinity of Pole #5".



## BIDDER'S CHECKLIST

- Bidder's Checklist (This Form) – Please include this form in the bid submission with each item included in the bid submission checked off within the circle for that item.

### **FAILURE TO SUBMIT THE FOLLOWING FORMS WITH THE BID SHALL BE CAUSE FOR AUTOMATIC REJECTION**

- BID FORM – PART A
- BID FORM – PART B - ALTERNATES
- Acknowledgment of Receipt of Addenda / Clarifications. If no Addenda / Clarifications are issued, form shall still be submitted, with the applicable box checked on the form
- Statement of Ownership
- Bid Bond
- Consent of Surety
- Total Amount of Uncompleted Contracts Affidavit (Form DPMC 701)
- No Material Adverse Change in Qualification

### **THE FOLLOWING FORMS ARE REQUESTED TO BE SUBMITTED WITH THE BID BUT MUST BE PROVIDED PRIOR TO AWARD**

- Notice of Classification issued by the State of New Jersey Department of the Treasury Division of Property Management and Construction
- Hold Harmless Agreement
- Certification Regarding the Debarment, Suspension, Ineligibility and Voluntary Exclusion
- Certification of Non-Debarment for Federal Government Contracts
- Affirmative Action Requirements
- Exhibit B Mandatory Equal Employment Opportunity Language
- Non-Collusion Affidavit
- C.271 Political Contribution Disclosure Form

BIDDER'S CHECKLIST

- Disclosure of Investment Activities in Iran
- Public Works Contractor Registration Certificate
- Business Registration Certificate

**THE FOLLOWING INFORMATION IS TO BE PROVIDED IN THE CASE OF ALL PRIME SUBCONTRACTORS (DEFINED AS THOSE SUBCONTRACTORS THAT WILL FURNISH LABOR OF THE VARIOUS TRADES GOVERNED BY N.J.S.A. 18A:18A-18(B): GENERAL CONSTRUCTION, STEEL, PLUMBING, HVAC, ELECTRIC). UNDERLINED ITEMS MUST BE SUBMITTED WITH THE BID. ALL OTHER ITEMS ARE REQUESTED TO BE SUBMITTED WITH THE BID BUT MUST BE PROVIDED PRIOR TO CONTRACT AWARD**

- A valid and active DPMC Notice of Classification,
- A Total Amount of Uncompleted Contracts Affidavit (form DPMC 701)
- No Material Adverse Change in Qualification Form
- Trade License (if applicable)
- Business Registration Certificate
- Public Works Contractor Registration Certificate

TRADE	Prime Subcontractor Name	DPMC Notice of Class	Uncompleted Contracts	No Material Change	Trade License	Bus. Reg.	Public Works Certificate
GENERAL					N/A		
HVAC							
PLUMBING							
ELECTRICAL							
STRUCTURAL					N/A		

## NOTICE TO BIDDERS

Notice is hereby given that sealed bids will be received by the School Business Administrator / Board Secretary of the Delsea Regional Board of Education, at the Delsea Regional High School, **(Check in at the Main Office and Proceed to the Library)**, 242 Fries Mill Road, Franklinville, New Jersey 08322 until **3:00 P.M.** local time, on **Thursday, December 15, 2022** and will be publicly opened and read immediately thereafter, at said place for the **Delsea Regional High School New Fieldhouse Building and Toilet Room Addition.**

It is expressly understood that the Bidder is responsible for getting the bid to the School Business Administrator / Board Secretary no later than the time and date set for the bid opening. Bids shall be addressed to the Owner whose name appears in Paragraph 1a of the Instructions to Bidders; it shall be mailed or delivered to the address stated herein, enclosed in an opaque sealed envelope, marked with the name of the Project and Bidder as described in the Notice to Bidders; and must be received by not later than the time designated in the Notice to Bidders. No responsibility will attach to Architect or Owner for premature opening of a bid which is not properly identified. Any bid received after the closing time will be returned unopened. In order to be considered, bids must be sealed, with the outer envelope clearly marked with the name of the Bidder and the following **Delsea Regional High School New Fieldhouse Building and Toilet Room Addition.**

The Bidders are requested to submit, in accordance with N.J.S.A. 18A:18A-18(b)(2), one Lump Sum Bid for all the work and materials. Bidders and/or their Prime Subcontractors must be pre-qualified by the New Jersey Department of Treasury, Division of Property Management and Construction (DPMC) in the following categories, pursuant to N.J.S.A. 18A:18A-26 et seq.: C008 – General Construction; C029 – Structural Steel and Ornamental Iron; C032 – HVACR; C030 – Plumbing; and C047 – Electrical. The Bidder and named Prime Subcontractors, defined as those listed in N.J.S.A. 18A:18A-18, listed must be pre-qualified prior to the date that bids are received.

Electronic Copies of the Bid Documents may be obtained by contacting Garrison Architects via email at [jangelo@garrisonarch.com](mailto:jangelo@garrisonarch.com) There is no charge for obtaining an electronic copy of the Bid Documents.

Bids must be accompanied by a certified check, bank cashier's check, treasurer's check or Bid Bond in the form provided in the Contract Documents, with corporate surety satisfactory to the Owner, in an amount of 10% of the Base Bid (but in no case in excess of \$20,000.00, pursuant to N.J.S.A. 18A:18A-24), naming as payee or obligee, as applicable **Delsea Regional Board of Education**, to be retained and applied by the undersigned as provided in the Contract Documents in case the successful Bidder defaults in executing the Agreement or furnishing the bonds and insurance certificates as required by the Contract Documents.

Prospective Bidders are advised that this Project is one which will be subject to and will be governed by provisions of New Jersey laws governing (a) Prequalification of Bidders N.J.S.A. 18A:18A-26 et seq.; (b) Prevailing Wage Rates N.J.S.A. 34:11-56.27; (c) Use of Domestic Materials, N.J.S.A. 18A:18A-20 (d) Ownership Disclosure Certification N.J.S.A. 52:25-24.2; and (e) disclosure of investment activities in Iran, pursuant to N.J.S.A. 18A:18A-49.4 in accordance with to N.J.S.A. 52:32-57, et seq.

NOTICE TO BIDDERS

The Public Works Contractor Registration Act N.J.S.A. 34:11-56.48 et seq. requires that the Bidder and named Prime Subcontractors must be registered at the time of Bid. The Owner is requesting that copies of the Certificates be included in the Bidder's Bid Package, but Bidder must provide copies of the Certificates no later than the time of award. Pursuant to N.J.S.A. 52:32-44 all business organizations that do business with a local contracting agency are required to be registered with the State and provide proof of their Registration with the New Jersey Department of Treasury, Division of Revenue before the contracting agency may enter into a contract with the business. In addition, and pursuant to N.J.S.A. 18A:18A-25, each bid must be accompanied by a certificate from a surety company stating it will provide said Bidder with a bond in the amount of 100% of the Contract price.

No bid may be withdrawn for a period of sixty (60) days after the dates set for the opening thereof. The right is reserved to reject all bids pursuant to N.J.S.A. 18A:18A-22 or to waive minor informalities or non-material exceptions in accordance with applicable law. Bidders are required to comply with the provisions of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27 et seq.

The Time Schedule for the project is as follows:

<b>Monday</b>	<b>11/14/22</b>	Bid packages available via Electronic Delivery
<b>Thursday</b>	<b>11/17/22</b>	Pre-bid meeting at <b>3:00 P.M. at the Delsea Regional School District Board of Education, in the Media Center, 242 Fries Mill Road, Franklinville, New Jersey 08322. Attendance at the Pre-Bid meeting is not mandatory, but strongly recommended.</b>
<b>Thursday</b>	<b>12/01/22</b>	Deadline for Questions at 5:00 P.M. (email to <a href="mailto:jangelo@garrisonarch.com">jangelo@garrisonarch.com</a> )
<b>Monday</b>	<b>12/05/22</b>	Addendum Emailed to Bidders, if necessary
<b>Thursday</b>	<b>12/15/22</b>	Bids Due at <b>3:00 P.M. at the Delsea Regional School District Board of Education, in the Media Center, 242 Fries Mill Road, Franklinville, New Jersey 08322</b>

By Order of the Delsea Regional Board of Education  
Joseph Collins, C.P.A., School Business Administrator /Board Secretary

## INSTRUCTIONS TO BIDDERS

(The following instructions shall be adhered to in the preparation of this bid by the bidder.)

### 1. DEFINITIONS

- a. Owner: The term "Owner" as used in the Contract Documents refers to  
  
**Delsea Regional Board of Education  
242 Fries Mill Road  
Franklinville, New Jersey 08322**
- b. Architect: The term "Architect" refers to Garrison Architects, 713 Creek Road, Bellmawr, New Jersey 08031, (856) 396-6200, Fax (856) 396-6205.
- c. Contractor: The term "Contractor" refers to the bidder to whom an award is made to perform the work under the Contract enumerated in the Notice to Bidders.
- d. School Facilities Project: This is the construction project which is the subject of this specification.

### 2. PREPARATION OF BIDS

- a. Bids shall be submitted on the Bid Form. All blank spaces of the form shall be fully completed in accordance with these instructions, without variation, and there shall be no interlineations, deletions or additions. Base Bid Sum shall include the allowance and shall be stated both in writing and in figures; and, in case of discrepancy, written words shall be considered as being the Base Bid Sum.

Submit bid in duplicate (1 original and 1 copy).

- b. Bids shall not contain recapitulations of the work to be done. No oral, telegraphic or telephonic communications or modifications shall be considered.
- c. Bids shall be addressed to the Owner whose name appears in Paragraph 1a of the Instructions to Bidders; it shall be mailed or delivered to the address stated in the Notice to Bidders, enclosed in an opaque sealed envelope, marked with the name of the Project and bidder as described in the Notice to Bidders; and must be received by not later than the time designated in the Notice to Bidders. No responsibility will attach to Architect or Owner for premature opening of a bid which is not properly identified.

## INSTRUCTIONS TO BIDDERS

### 3. DISCREPANCIES OR OMISSIONS: BIDDER'S RESPONSIBILITY

- a. Bidders who find discrepancies in or omissions from the Contract Documents or are in doubt as to their meaning should at once notify the Architect in writing no later than 5:00 P.M. on the date set forth in the "Notice to Bidders". If it is deemed necessary, instructions in the form of Addenda / Clarifications to Specifications and / or Drawings will be issued to all bidders by email on the date set forth in the "Notice to Bidders". Owner or Architect will not be responsible for any oral instructions. **It will be assumed with the submission of the bid that the bidder has fully examined the site, the Drawings and the Specifications, and has made provisions for construction under the conditions as set forth and is responsible for seeing that its proposed Subcontractors are familiar with requirements of Contract Documents so far as applicable to their work.**
- b. Bids shall be based upon Drawings, Specifications and other documents constituting the Contract Documents referred to in the Notice to Bidders, bound herewith, including related Addenda / Clarifications issued by Garrison Architects, and may not be withdrawn for a period of 60 days after date set for receiving bids. Any bid which has been opened by the Owner may not be withdrawn during the period specified in the herein except as specifically permitted by law.

### 4. BID SECURITY: FORFEITURE

- a. Bids shall be accompanied by a bid guarantee in the form of a Bid Bond issued by a Surety licensed in the State of New Jersey, cashier's check or a certified check issued by a national bank or trust company and payable to the order of the Owner in the amount of ten (10%) percent of the Bid or \$20,000, whichever is less, pursuant to N.J.S.A. 18A:18A-24, to be retained and applied as provided, in case the bidder should default in executing the Agreement or furnishing the required insurance certificates within ten (10) days after notice that an award has been made to it or in case the bidder should default in furnishing the required Performance and Payment Bond as required by the Contract Documents. The Surety shall be authorized to do business in New Jersey.
- b. Bid securities of the three lowest responsible bidders for each Contract will be retained until Contract Documents have been properly executed by bidder to whom Contract is awarded but in no event exceeding 60 days after bid opening, unless bidders consent to a longer period at the request of the Owner. In the event that a Bid Bond is submitted with the bid, the bidder shall make certain that a proper power of attorney evidencing the authority of the agent of the surety to execute the Bid Bond is furnished therewith.
- c. Bidders who intend to submit a Bid Bond as the required security with their bids must use the form of Bid Bond provided or its legal equivalent. Such bidders must also provide a Power of Attorney for the Attorney-In-Fact who issued the Bond, which document must be currently dated and valid for the entire amount of the Bond.



## INSTRUCTIONS TO BIDDERS

### 5. CONSENT OF SURETY

Pursuant to N.J.S.A. 18A:18A-25, bids shall be accompanied by a Consent of Surety assuring that satisfactory arrangements have been made between the Surety and the bidder, by which the Surety agrees to furnish the bidder with a Performance Bond and Payment Bond, each in the stated amount of one hundred percent of the Contract amount. The Consent of Surety shall be executed by an approved Surety Company authorized to do business in the State of New Jersey. The Surety's consent and guarantee to issue the Performance Bond and Payment Bond must be unconditional. **Submission of a Consent of Surety which contains any prior conditions upon the Surety's issuance of the required Bonds shall be cause for rejection of the Bid.**

### 6. AWARD OF CONTRACT

- a. The Owner reserves the right to reject all bids and to waive minor informalities or non-material exceptions in the bid, in accordance with applicable law. Bids may be rejected if they show any omissions, alterations of form, additions or deductions not called for, conditional or uninvited alternate bids, or irregularities of any kind. Bids in which the prices are unbalanced may be rejected. Claims on account of mistakes in or omissions in bids will not be considered, except as specifically permitted by law.
- b. The Owner reserves the right to reject all bids pursuant to the Public School Contract Laws, or to waive minor and/or non-material defects in the bidding as may be permitted by law. The Owner reserves the right to disqualify a bidder with whom the Owner, and/or any other school district in the State of New Jersey, had prior negative experience(s) as defined and in accordance with N.J.S.A. 18A:18A-4(b)(1) et seq.
- c. Before awarding a Contract, the Owner may require the apparent low bidder for the Contract to provide proof that the bidder possesses the necessary equipment that will be required to complete this project in accordance with N.J.S.A. 18A:18A-23.
- d. The award of Contract or rejection of bids will be made within sixty (60) days of the Bid Opening, except that the bids of any bidders who consent thereto may, at the request of the Owner, be held for consideration for such longer period as may be agreed.
- e. If awards are made, the Owner and Contractor will execute the Agreement within twenty-one (21) days after the date of the award, Sundays and holidays excepted. This time may be extended by agreement of all parties to the Agreement.
- f. The Agreement and Performance and Payment Bond forms included with these Specifications exemplify the type of Contract forms that the successful bidder will be required to execute before or after award has been made, in accordance with the Contract Documents and State law governing such Bonds.
- g. Change orders under the Contract are subject to the availability of funds per N.J.A.C. 6A:23A-21.1.

### 7. CHANGES PRIOR TO OPENING OF BIDS

- a. During the period allowed for the preparation of bids, the Architect may furnish the prospective bidders Addenda/Clarifications setting forth additions to or alterations of the Contract Documents, which additions or alterations shall be included by each bidder in the computation of amounts to be inserted by it in the bid which it submits, and which Addenda / Clarifications shall become a part of such Contract Documents as if the same were fully incorporated herein.

## INSTRUCTIONS TO BIDDERS

- b. It shall be the duty of each prospective bidder to ascertain what Addenda / Clarifications, if any, have been issued by the Architect, which may affect the work to be covered by its bid, and to inform its prospective Subcontractors thereof to the extent that they may be affected.
- c. Any Addenda / Clarifications issued by the Architect will be sent to each prospective bidder of whom the Architect shall have a record pursuant to N.J.S.A. 18A:18A-21.

### 8. START OF WORK

Shop Drawings, Submittals, etc. can be commenced after Notice to Proceed has been given by Owner or Architect.

### 9. COMPLETION OF THE PROJECT

The project must be completed by the date set forth in the Specification Section 01010- Summary of Work. In accordance with 18A: 18A-19, the Owner may deduct, from the contract price, for any wages paid by the Owner to any inspector or inspectors necessarily employed by it on the work, for any number of days in excess of the completion date.

### 10. BONDS AND INSURANCE

Requirements for Bonds and Insurance are stated in these Instructions to Bidders, Specifications and the AIA Document A201 – 2017 General Conditions of Contract for Construction. Performance and Payment Bonds are required in the amount of 100% of contract price for each Bond. A Two (2) year Maintenance Bond is required in the amount of 100% of the Contract.

Performance Bond, Payment Bond and Maintenance Bond need not be submitted with the bidder's bid, but must be submitted prior to execution of the contract. Performance Bond and Payment Bond shall be in compliance with requirements of N.J.S.A. 18A:18A-25 and N.J.S.A. 2A:44-143 et seq.

### 11. STATEMENT OF BIDDER'S QUALIFICATIONS

In accordance with N.J.S.A. 18A:18A-26 et seq. each bidder shall submit the following documents for itself (and for each of its Prime Subcontractors) from the State of New Jersey's Department of the Treasury, Division of Property Management and Construction:

- (1) A NOTICE OF CLASSIFICATION indicating that they are qualified to bid on the public work as specified herein. The bidder and/or named Prime Subcontractors must be pre-qualified by the New Jersey Department of Treasury, Division of Property Management and Construction, prior to the date that bids are received. This document is requested to be provided with the bid but shall be provided prior to award. The required categories are: C008 – General Construction, C029 – Structural Steel and Ornamental Iron, C032 – HVACR, C030 – Plumbing, and C047 – Electrical; and
- (2) A TOTAL AMOUNT OF UNCOMPLETED CONTRACTS affidavit (Form DPMC 701) duly signed and notarized with the corporate seal affixed. This document must be submitted with the bid.
- (3) An affidavit of no material adverse change in qualification information since the latest statement in accordance with N.J.S.A. 18A:18A-32. This document must be submitted with the bid for the bidder and is requested to be submitted with the bid for each Prime Subcontractor, but must be submitted prior to award.

## INSTRUCTIONS TO BIDDERS

### 12. NEW JERSEY PREVAILING WAGE RATE / PUBLIC WORKS CONTRACTOR REGISTRATION

Bidders are required to comply with the State Prevailing Wage Rate for Public Works, N.J.S.A. 34:11-56.25 et seq., as amended.

Contractor shall ensure that all workers employed in the performance of this Contract shall be paid not less than the Prevailing Wage Rate designated for this locality by the Commission of Labor and Workforce Development. If it is found that any worker employed by the Contractor or any Subcontractor has been paid less than the Prevailing Wage Rate, the Owner 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 its sureties shall be liable for any excess costs occasioned thereby to the Owner.

The Contractors can reference the State of New Jersey Department of Labor and Workforce Development Website <https://www.nj.gov/labor/wagehour/wagerate/CurrentWageRates.html> to view current Prevailing Wage Rates. The official wage rates will provided to the Contractor by the Owner once the Contract has been officially awarded.

The Public Works Contractor Registration Act, N.J.S.A. 34:11-56.48 et seq. (the Act) requires that Contractors and Listed Prime Subcontractors (defined as those listed in N.J.S.A. 18A:18A-18) must be registered pursuant to the Act prior to submitting a bid. The bidder should provide a copy of the Public Works Contractor Registration Certificate for itself and any listed prime subcontractors at the time of submission of the bid, but must provide the Public Works Contractor Registration Certificate for itself and any listed prime subcontractors prior to award. The Contractor shall enter into subcontracts only with subcontractors who are registered pursuant to the Act.

### 13. BUSINESS REGISTRATION AND USE TAX

Pursuant to N.J.S.A. 52:32-44, Delsea Regional Board of Education ("Owner") is prohibited from entering into a contract with an entity unless the bidder, 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.

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).

Subcontractors named in a bid 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 contracting document is awarded or authorized.

During the course of contract performance:

- (1) 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.
- (2) the contractor shall maintain and submit to the Owner a list of subcontractors and their addresses that may be updated from time to time.

## INSTRUCTIONS TO BIDDERS

- (3) 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>.

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.

Pursuant to N.J.S.A. 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 a contracting agency.

### 14. OWNERSHIP DISCLOSURE CERTIFICATION

No corporation, partnership, or limited liability company shall be awarded any contract nor shall any agreement be entered into for the performance of any work or the furnishing of any materials or supplies, the cost of which is to be paid with or out of any public funds, by the State, or any county, municipality or school district, or any subsidiary or agency of the State, or of any county, municipality or school district, or by any authority, board, or commission which exercises governmental functions, unless prior to the receipt of the bid or proposal, or accompanying the bid or proposal of said corporation, said partnership, or said limited liability company there is submitted a statement setting forth 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.

**If one or more such stockholder or partner or member is itself a corporation or partnership or limited liability company, the stockholders holding 10 percent or more of that corporation's stock, or the individual partners owning 10 percent or greater interest in that partnership, or the members owning 10 percent or greater interest in that limited liability company, as the case may be, shall also be listed. 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 in this act, has been listed.**

To comply with this section, a bidder with any direct or indirect parent entity which is publicly traded may submit the name and address of each publicly traded entity and the name and address of each person that holds a 10 percent or greater beneficial interest in the publicly traded entity as of the last annual filing with the federal Securities and Exchange Commission or the foreign equivalent, and, if there is any person that holds a 10 percent or greater beneficial interest, also shall submit links to the websites containing the last annual filings with the federal Securities and Exchange Commission or the foreign equivalent and the relevant page numbers of the filings that contain the information on each person that holds a 10 percent or greater beneficial interest.

This Ownership Disclosure Certification form shall be completed, signed, notarized, and submitted with the bid.

## INSTRUCTIONS TO BIDDERS

### 15. DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN

The Owner, pursuant to N.J.S.A. 18A:18A-49.4, shall implement and comply with Disclosure of Investment Activities in Iran N.J.S.A. 52:32-55 et seq.

Pursuant to N.J.S.A. 52:32-57 et seq. (P.L. 2012, c.25 and P.L. 2021, c.4) any person or entity that submits a bid or proposal or otherwise proposes to enter into or renew a contract must certify, prior to the time a contract is awarded and at the time the contract is renewed, that neither the person nor entity, nor any of its parents, subsidiaries, or affiliates, is identified on the New Jersey Department of the Treasury's Chapter 25 List as a person or entity engaged in investment activities in Iran. The Chapter 25 list is found on the Division's website at <https://www.state.nj.us/treasury/purchase/pdf/Chapter25List.pdf>.

Vendors/bidders must review this list prior to completing the below certification. If the Director of the Division of Purchase and Property finds a person or entity to be in violation of the law, s/he shall take action as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the party.

If the Owner determines that a person or entity has submitted a false certification concerning its engagement in investment activities in Iran under N.J.S.A. 52:32-58, the Owner shall report to the New Jersey Attorney General the name of that person or entity, and the Attorney General shall determine whether to bring a civil action against the person to collect the penalty prescribed in N.J.S.A. 52:32-59.

In addition, bidders must provide a detailed, accurate and precise description of the activities of the bidding person/entity, or any of its parents, subsidiaries or affiliates, engaging in the investment activities in Iran outlined above by completing the boxes on the lower portion of the enclosed form.

The Owner has provided within the specifications, a Disclosure of Investments Activities certification form for all persons or entities, that plan to submit a bid, respond to a proposal, or renew a contract with the Owner, to complete, sign and submit prior to the award of the proposal.

**The Disclosure of Investment Activities in Iran Form is to be completed, certified and submitted prior to the award of contract.**

### 16. N.J.S.A. 10:5-31, et seq. AFFIRMATIVE ACTION REQUIREMENTS

Pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented, the following Affirmative Action requirements on the Project will be a condition of the Contract: The bidder, its subconsultants and subcontractors 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 shall guarantee to afford equal opportunity in performance of this Agreement in accordance with an affirmative action program approved by the State Treasurer.

### 17. N.J.S.A. 10:2-1. Anti-discrimination 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:

## INSTRUCTIONS TO BIDDERS

- 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 its 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.

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 P.L.1985, c.490 (C.18A:18A-51 et seq.

### 18. DOMESTIC MATERIALS/BUY AMERICAN

Pursuant to N.J.S.A. 18A:18A-20, Contractor shall use only manufactured and farm products of the United States, wherever available.

### 19. SUBSTITUTION REQUESTS

Please refer to Specification Section 01300, "Submittals." "Or Equal" substitutions are permitted so long as they are equal to or superior to the basis of design and the Contractor takes full responsibility for all coordination and costs associated with collateral issues related to the substitution. No Substitutions will be reviewed during the bidding process. The Contractor takes full responsibility for all substitutions. Substitution submittals shall be made **no later than 30 days after Notice to Proceed** in order to provide time for comparison review. All submittals after 30 days shall be in strict accordance with the basis of design / specified products.

### 20. METHOD OF AWARD - LOWEST QUALIFIED BIDDER(S)

If at the time this Contract is to be awarded, the lowest Base Bid (with any accepted alternates) submitted by a responsible Bidder does not exceed the amount of funds then estimated by the Owner as available to finance the Contract the contract will be awarded. If said Bid exceeds such amount, the Owner may reject all bids.

## INSTRUCTIONS TO BIDDERS

21. Form AIA 101-2017 "Standard Form of Agreement Between Owner and Contractor" and AIA-A201-2017 "General Terms and Conditions" as modified by the Owner (and enclosed herein), shall be the standard agreement form used for Contracts for this project.
  
22. **MANDATORY ELEC DISCLOSURE REQUIREMENT, P.L. 2005, CHAPTER 271**  
The Contractor is advised of its responsibility to file an annual disclosure statement on political contributions with the New Jersey Election Law Enforcement Commission (ELEC), pursuant to N.J.S.A. 19:44A-20.27 if the contractor receives contracts in excess of \$50,000 from a public entity in a calendar year. It is the contractor's responsibility to determine if filing is necessary. Failure to so file can result in the imposition of financial penalties by ELEC. Additional information about this requirement is available from ELEC at 888-313-3532 or at [www.elec.state.nj.us](http://www.elec.state.nj.us). In accordance with N.J.A.C. 6A:23A-6.3 the Owner may not award a contract over \$17,500 to a bidder that has made a reportable contribution to a member of the Board of Education during the preceding one-year period.
  
23. **NON-COLLUSION AFFIDAVIT**  
The bidder is requested to submit with its bid the Non-Collusion Affidavit contained herein.
  
24. **AMERICANS WITH DISABILITIES ACT, 42 U.S.C. 12101**  
The CONTRACTOR and the OWNER do hereby agree that the provisions of Title II of the Americans with Disabilities Act of 1990 (the "Act") (42 U.S.C. §12101 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 thereto, 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, or 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 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.

## INSTRUCTIONS TO BIDDERS

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 proceedings 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 to 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.

25. **NEW JERSEY OFFICE OF CLEAN ENERGY REBATE REQUIREMENTS**

During the performance of the contract, if and when requested by the Owner or the Owner's Representative, provide all required documentation including Submittals, Shop Drawings, and Cost Information (for materials and installation) for any equipment, systems or components, in order for the Owner to pursue Grants and Reimbursement through the New Jersey Office of Clean Energy. The Contractor may be required to provide detailed pricing information including invoices of materials and a breakdown of labor or equipment costs as it pertains to individual pieces of equipment, systems or components.

26. **STUDENT AND FACULTY SAFETY REQUIREMENTS:**

During the performance of this contract, neither the Contractor nor any Subcontractor, where applicable, shall knowingly allow any employee registered pursuant to N.J.S.A. 2C:7-1, et seq. "Megan's Law," as a Tier 3 offender ("sex offenders determined to pose a relatively high risk of re-offense") or a Tier 2 offender ("sex offenders determined to pose a moderate risk of re-offense"), upon the Owner's property or the Project site. All employees of the Contractor and any Subcontractor will be required to wear picture identification cards in a visible manner while working on the Owner's premises. During the performance of this contract, neither the Contractor nor any Subcontractor, where applicable, shall knowingly allow any employee to enter any area of the Project where students or faculty are present, without first providing the Owner with a written list setting forth the identity of the employees.

All personnel or agents of the Contractor shall observe all rules and regulations in effect at the Owner's premises. Employees or agents of the Contractor, while on the Owner's property, shall be subject to the control of the Owner, but under no circumstances shall such persons be deemed to be employees or agents of the Owner. Contractor's personnel are required to sign in at the Main Office each time they report for service.



## INSTRUCTIONS TO BIDDERS

Contractor's personnel are not to engage with any activities with the students, staff or other Owner's employees unless duly authorized to do so in writing by the Business Administrator or Superintendent. Contractor's personnel are to wear uniforms whenever possible. All contracted personnel are required to wear identification badges identifying the individual and the firm for which they are employed. Contractors shall assume full responsibility for the actions of all personnel in their employ. Contractors shall maintain proper supervision of the work in progress at all times.

All personnel used by the Contractor for the performance of this work shall be properly trained and qualified for work of this type and shall have the minimum ability and experience for its classification. Owner reserves the right to refuse to accept services from any personnel deemed by the Owner or its representative to be unqualified, disorderly, or unable to perform assigned work. The Contractor shall provide evidence of qualifications for any personnel performing work under contract upon request.

Owner (and/or the Owner's Representatives) reserves the right to direct the removal from the site of any person, equipment and/or entity which displays inappropriate behavior, including but not limited to, alcohol consumption, drugs, fighting, intimidating or disruptive behavior, vandalism, theft, improper storage, illegal acts, unfit persons etc.

27. **CRIMINAL HISTORY BACKGROUND CHECKS – N.J.S.A. 18A:6-7.1- REQUIRED**

The Contractor and all Subcontractors for the project shall provide to the Owner evidence or proof that each worker assigned to the project that comes in regular contact with students, had had a criminal history background check, and that said check indicates that no criminal history record information exists on file for that worker.

The determination of "regular contact with students" will be made by the Owner. Failure to provide a proof of criminal history background check for any contractor or subcontractor employee coming in regular contact with students may be cause for breach of contract. If it is discovered during the course of the contract that a contractor or subcontractor employee has a disqualifying criminal history or the employee has not had a criminal history background check, that employee is to be removed from the project immediately.

28. **Covid-19 Requirements: All onsite personnel shall comply with the latest Federal, State and Local authorities having jurisdiction regarding Covid-19 protocols.**

29. **The successful bidder will be expected after contract award to comply with and complete all required forms, written authorizations and/or other information issued by the Owner for the disclosure of information in accordance with the mandates of N.J.S.A. 18A:6-7.7 et seq. which concerns prior acts and/or investigations of sexual misconduct and/or child abuse for those contracted service providers who are employed in positions which involve regular contact with students. The successful bidder is further notified that failure to provide truthful information or willfully failing to disclose information required by N.J.S.A. 18A:6-7.7 et seq., may subject the successful bidder to discipline up to, and including, termination or denial of employment; may be a violation of N.J.S.A. 2C:28-3; and may be subject to a civil penalty of not more than \$500, which shall be collected in proceedings in accordance with the "Penalty Enforcement Law of 1999," P.L. 1999, c. 274.**

## INSTRUCTIONS TO BIDDERS

30. ANTI-BULLYING BILL OF RIGHTS – REPORTING OF HARRASSMENT, INTIMIDATION AND BULLYING – CONTRACTED SERVICE

The Contractor shall comply with all applicable provisions of the New Jersey Anti-Bullying Rights Act – N.J.S.A. 18A:37-13.1 et seq. and N.J.S.A. 18A:37-16, all applicable code and regulations, and the Anti-Bullying Policy of the Owner. The Owner shall provide to the contracted service provider a copy of the Owner's Anti-Bullying Policy.

In accordance with N.J.A.C. 6A:16-7.7 (c), a contracted service provider, who has witnessed, or has reliable information that a student has been subject to harassment, intimidations, or bullying shall report the incident to any school administrator or safe schools resource officer, or the School Business Administrator/Board Secretary, who shall immediately initiate the Owner's procedures concerning harassment, intimidation, and bullying.

31. RECORD MAINTENANCE

Pursuant to N.J.A.C. 17:44-2.2, the Contractor 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.

32. CONTRACTOR PERFORMANCE EVALUATION

In accordance with N.J.S.A. 18A:18A-15, when the entire cost of the Project will exceed \$20,000.00, the Owner, through its authorized agent, shall upon the completion of the contract report to the Department of the Treasury as to the contractor's performance, and shall also furnish such report from time to time during performance if the contractor is then in default.

33. District officials and/or employees are precluded from taking part in the negotiations or the awarding of contracts to companies with which they may have a conflict of interest, as set forth in N.J.S.A. 18A:12-24.

34. The District represents that none of its employees, and to the best of its knowledge, none of its contracted parties or employees of its contracted parties, are engaged in any conduct that would constitute a conflict of interest or a violation of the School Ethics Act N.J.S.A. 18A:12-21 et seq.

35. The Contractor and its Subcontractors may be debarred, suspended or disqualified from contracting and/or working on the Project if found to have committed any of the acts listed in N.J.A.C. 17:19-4.1.

36. The District shall keep those records and accounts and shall require All Contracted Parties including the Contractor and Subcontractors, are required to keep those records referenced in paragraph 31, above, and accounts for the Project as necessary in order to evidence compliance with the Public Schools Contract Law (PSCL).

37. The Contractor agrees to retain during the term of the Contract and for 10 years after closeout thereafter all financial records, supporting documents and other records which relate in any way to the work. If any litigation, claim or audit is commenced prior to the expiration date, such records and documents shall be retained by the Contractor until all litigation, claims or audit findings involving the records have been resolved.

END OF SECTION

BID FORM – PART A

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

Bidder's Information: (Print or Type)

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

Contact Name: \_\_\_\_\_

Contact Email Address: \_\_\_\_\_

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

\_\_\_\_\_

Telephone Number: \_\_\_\_\_

Fax Number: \_\_\_\_\_

**Delsea Regional Board of Education  
242 Fries Mill Road  
Franklinville, New Jersey 08322**

Ladies and Gentlemen:

This Proposal is submitted in accordance with your Notice to Bidders inviting proposals to be received for the **Delsea Regional High School New Fieldhouse Building and Toilet Room Addition**. Having carefully examined the Contract Documents and being familiar with various conditions affecting the work, the undersigned herein agrees to furnish all materials, perform all labor and do all else necessary to complete the **ENTIRE PROJECT** in accordance with said Contract Documents for the **LUMP SUM BASE BID (including the allowance) OF:**

BID AMOUNT \$ \_\_\_\_\_

PLUS CASH ALLOWANCE  
SECTION 01210 - ALLOWANCES ITEM A \$ 50,000.00

**TOTAL BASE BID** (In Numbers) (Bid Amount and the Allowances) \$ \_\_\_\_\_

(In words) \_\_\_\_\_

**Amount shall be shown in both words and figures. In case of discrepancy, the amount shown in words shall govern.**

BID FORM – PART A

The Delsea Regional Board of Education called “Owner” in accordance with bidding requirements for the work titled **Delsea Regional High School New Fieldhouse Building and Toilet Room Addition** for the portions of the Work below listed, the undersigned proposes to use the following Prime Subcontractors (indicate “Self-Performing” if you are doing the portion of the work required – please note you must be Pre-Qualified for the work to be “Self-Performing”):

<u>PORTION OF WORK</u>	<u>PRIME SUBCONTRACTOR’S NAME AND ADDRESS</u>
General Construction Work (C008)	_____ _____ _____
Structural Steel Work (C029)	_____ _____ _____
Heating and Ventilating Systems and Equipment (C032)	_____ _____ _____
Plumbing Work (C030)	_____ _____ _____
Electrical Work (C047)	_____ _____ _____

**The Prime Subcontractors listed above must be registered pursuant to the Public Works Contractor Registration Act (N.J.S.A. 34:11-56.48 et seq.) and DPMC pre-qualified at the time of bid submission.** The Bidder shall provide with his/her Bid for each such Prime Subcontractor listed above (OR HIMSELF/HERSELF IF SELF-PERFORMING), a Total Amount of Uncompleted Contracts Affidavit (form DPMC 701). The Owner is requesting that the Bidder provide a valid and active DPMC Notice of Classification, No Material Adverse Change in Qualification Form, Public Works Contractor Registration Certificate and a Business Registration Form with the bid as well, but shall provide these no later than the time of award.

BID FORM – PART A

Accompanying this Proposal is a certified check, bank cashier's check or Bid Bond required by Paragraph 4 of the Instructions to Bidders, which is deposited as a Proposal guarantee, and is to be retained by you and applied as provided in Paragraph 4 of Instructions to Bidders in case the undersigned shall default in executing the Contract or in furnishing the required bonds and insurance certificates within the time specified by the Contract Documents.

The undersigned hereby certifies that this Proposal is genuine and not sham or collusive or made in the interest of or in behalf of any person, firm or corporation not herein named and that the undersigned has not directly or indirectly induced or solicited any bidder to refrain from bidding and that the undersigned has not in any manner sought by collusion to secure for himself any advantages over any other bidder.

The undersigned, intending to be legally bound, agrees that this Proposal shall be irrevocable and shall remain subject to your acceptance for 60 days after date set for bid opening.

The undersigned submits this Proposal with the full knowledge of the Contract requirements and hereby agrees that the work of this Project, under this Contract, shall be fully and finally completed and ready for occupancy in accordance with the date found in Specification Section 01010 – Summary of Work.

\_\_\_\_\_  
NAME OF BIDDER

\_\_\_\_\_  
SIGNATURE

\_\_\_\_\_  
DATE



BID FORM - PART B - ALTERNATES

1.1 GENERAL

- A. An alternate is an amount proposed by bidders and stated on the Bid Form for certain work that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents. The Owner will select Alternate Bid Items in its best interest and subject to its budgetary limitations. **If selected Alternates are applicable**, the lowest responsible bid and contract price will be calculated as the sum of the base bid and the amount bid for the selected Alternate Bid Items.
  - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.
  
- B. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate that Work into the Project.
  
- C. Schedule: A "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each alternate. **The Contractor shall enter the amount to be added or deducted from the base contract amount for each alternate listed below. Fill in "0" or N/A if no work or cost is associated with an alternate.**

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

SCHEDULE OF ALTERNATES

- 1. Alternate Bid # 1: Provide the proposed Toilet Room Addition including all associated site and utility work, building construction, mechanical, plumbing and electrical systems as required for a fully functional public toilet facility. Coordinate with existing building construction and systems as required to integrate new work. Refer to the drawings for the full scope of Alternate Bid work.

Alternate #1 – ADD        \$ \_\_\_\_\_

- 2. Alternate Bid # 2: Provide new graphic display coverings at the sides and back of the existing stadium bleacher assembly (Bleacher Wrap by Ball Fabrics or Approved Equal). Refer to the drawings for the full scope of Alternate Bid work.

Alternate #2 – ADD        \$ \_\_\_\_\_

END OF SECTION





ACKNOWLEDGMENT OF RECEIPT OF ADDENDA / CLARIFICATIONS

The undersigned Bidder hereby acknowledges receipt of the following Addenda:

<u>Addendum Number</u>	<u>Dated</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

<u>Clarification Number</u>	<u>Dated</u>
_____	_____
_____	_____
_____	_____

Check here if No Addenda / Clarifications were issued.

Acknowledged for: \_\_\_\_\_  
(Name of Bidder)

By: \_\_\_\_\_  
(Signature of Authorized Representative)

Name: \_\_\_\_\_

Title: \_\_\_\_\_

**FAILURE TO COMPLETE AND RETURN THIS FORM WITH YOUR BID  
SUBMISSION SHALL BE CAUSE FOR YOUR BID TO BE REJECTED**



STATEMENT OF OWNERSHIP  
(OWNERSHIP DISCLOSURE CERTIFICATION)  
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 Included with All Bid and Proposal Submissions**

**Name of Business:** \_\_\_\_\_

**Address of Business:** \_\_\_\_\_

**Name of person completing this form:** \_\_\_\_\_

**N.J.S.A. 52:25-24.2:**

"No corporation, partnership, or limited liability company shall be awarded any contract nor shall any agreement be entered into for the performance of any work or the furnishing of any materials or supplies, the cost of which is to be paid with or out of any public funds, by the State, or any county, municipality or school district, or any subsidiary or agency of the State, or of any county, municipality or school district, or by any authority, board, or commission which exercises governmental functions, unless prior to the receipt of the bid or proposal, or accompanying the bid or proposal of said corporation, said partnership, or said limited liability company there is submitted a statement setting forth 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.

If one or more such stockholder or partner or member is itself a corporation or partnership or limited liability company, the stockholders holding 10 percent or more of that corporation's stock, or the individual partners owning 10 percent or greater interest in that partnership, or the members owning 10 percent or greater interest in that limited liability company, as the case may be, shall also be listed. 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 in this act, has been listed.

To comply with this section, a bidder with any direct or indirect parent entity which is publicly traded may submit the name and address of each publicly traded entity and the name and address of each person that holds a 10 percent or greater beneficial interest in the publicly traded entity as of the last annual filing with the federal Securities and Exchange Commission or the foreign equivalent, and, if there is any person that holds a 10 percent or greater beneficial interest, also shall submit links to the websites containing the last annual filings with the federal Securities and Exchange Commission or the foreign equivalent and the relevant page numbers of the filings that contain the information on each person that holds a 10 percent or greater beneficial interest."

This Ownership Disclosure Certification form shall be completed, signed and notarized.

**Failure of the bidder/proposer to submit the required information is cause for automatic rejection of the bid or proposal**

## **Part I**

**Check the box that represents the type of business organization:**

- Sole Proprietorship
- Non-Profit Corporation (skip Parts II and III, sign and notarize at the end)
- Partnership  Limited Partnership  Limited Liability Partnership
- Limited Liability Company
- For-profit Corporation (including Subchapters C and S or Professional Corporation)
- Other (be specific): \_\_\_\_\_

## **Part II**

- I certify that the list below contains the names and addresses of all stockholders in the corporation who own ten percent (10%) or more of its stock, of any class, or of all individual partners in the partnership who own a ten percent (10%) or greater interest therein, or of all members in the limited liability company who own a ten percent (10%) or greater interest therein, as the case may be.

**OR**

- I certify that 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 that no member in the limited liability company owns a 10 percent or greater interest therein, as the case may be.

**Sign and notarize the form below, and complete the list below. 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 in this act, has been listed. (Please attach additional sheets if more space is needed):**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

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Name: \_\_\_\_\_

Address: \_\_\_\_\_

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Name: \_\_\_\_\_

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Name: \_\_\_\_\_

Address: \_\_\_\_\_

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Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

**Part III - Any Direct or Indirect Parent Entity Which is Publicly Traded:**

“To comply with this section, a bidder with any direct or indirect parent entity which is publicly traded may submit the name and address of each publicly traded entity and the name and address of each person that holds a ten percent (10%) or greater beneficial interest in the publicly traded entity as of the last annual filing with the federal Securities and Exchange Commission or the foreign equivalent filing, and, if there is any person that holds a ten percent (10%) or greater beneficial interest, also shall submit links to the websites containing the last annual filings with the federal Securities and Exchange Commission or the foreign equivalent filing, and the relevant page numbers of the filings that contain the information on each person that holds a ten percent (10%) or greater beneficial interest.”

- Pages attached with name and address of each publicly traded entity as well as the name and address of each person that holds a ten percent (10%) or greater beneficial interest.

**OR**

- Submit here the links to the Websites (URLs) containing the last annual filings with the federal Securities and Exchange Commission or the foreign equivalent.

---

---

**AND**

- Submit here the relevant page numbers of the filings containing the information on each person holding a 10 percent or greater beneficial interest.

---

---

**Please list** the names and addresses of each stockholder, partner or member owning a ten percent (10%) 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 ten percent (10%) 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	Address (for Individuals) or Business Address

Subscribed and sworn before me this \_\_\_\_ day of  
\_\_\_\_\_, 20\_\_\_\_\_.

(Notary Public)

My Commission expires:

\_\_\_\_\_  
(Affiant)

\_\_\_\_\_  
(Print name of affiant and title if applicable)

(Corporate Seal if a Corporation)





BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, \_\_\_\_\_  
Company Name

\_\_\_\_\_  
Company Address

as Principal, and \_\_\_\_\_  
Insurance Company Name

\_\_\_\_\_  
Insurance Company Address

as Surety, are hereby and firmly bound unto Delsea Regional Board of Education, 242 Fries Mill Road, Franklinville, New Jersey 08322 as Owner, in the penal sum of Ten Percent of the Amount of Bid Not to Exceed Twenty Thousand and 00/100 Dollars (10% Not to Exceed \$20,000.00) for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed, this \_\_\_\_\_ Day of \_\_\_\_\_, 20\_\_\_\_\_.

The condition of the above obligation is such that, whereas the Principal has submitted to **Delsea Regional Board of Education** a certain bid, attached hereto and hereby made a part hereof to enter into a contract in writing for the **Delsea Regional High School New Fieldhouse Building and Toilet Room Addition**.

NOW, THEREFORE,

- (a) If said Bid shall be rejected, or in the alternate,
- (b) If said Bid shall be accepted and the Principal shall execute and deliver an AIA Document A101 Standard Form of Agreement Between Owner and Contractor (properly completed and amended in accordance with said Bid) and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of the Bid,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims thereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligation of said Surety and its bond shall be in no way impaired or affected by an extension of the time within which the Owner may accept such bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper offer, the day and year first set forth above.

Attest / Witness

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Company Name

By: \_\_\_\_\_

Signature

\_\_\_\_\_  
Name and Title

\_\_\_\_\_  
Insurance Company Name

By: \_\_\_\_\_

Signature

\_\_\_\_\_  
Name and Title

\_\_\_\_\_  
Signature

ANY BOND COMPLYING WITH THE REQUIREMENTS OF N.J.S.A 18A:18A-24 MAY BE USED.

CONSENT OF SURETY

The \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(Name and Address of Surety)

a corporation existing under the Laws of the State of \_\_\_\_\_  
and authorized to do business under the Laws of the State of New Jersey, hereby certifies that application  
has been made to us by

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(Name and Address of Contractor)

and satisfactory arrangements have been completed by which we have and do now agree to furnish a  
Performance Bond and a Payment Bond both equal to 100% of the Contract to ensure the faithful  
performance on the part of the Bidder of the terms and conditions of the contract.

**Title of the Work: Delsea Regional High School New Fieldhouse Building and Toilet Room  
Addition**

**Location of the Project: 242 Fries Mill Road, Franklinville, New Jersey 08322**

This proposition is made with the understanding that any change made in the specifications or agreements  
without the consent of the bondsman shall in no way vitiate the bond.

WITNESS:

SURETY COMPANY

\_\_\_\_\_

\_\_\_\_\_

(Name of Surety Company)

Title: \_\_\_\_\_

(Attorney-in-fact)

By: \_\_\_\_\_

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

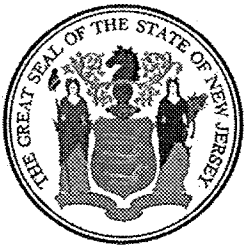
(Affix corporate seal)

**IMPORTANT NOTE**

The Surety Company executing the Bond must be authorized to transact business in the State of New  
Jersey. For contracts in excess of \$850,000, the Surety shall be listed on the Treasury Department's most  
current New Jersey List of Approved Sureties, located at [www.state.nj.is/dobi/surety.htm](http://www.state.nj.is/dobi/surety.htm).

ANY FORM CONSENT OF SURETY COMPLYING WITH THE REQUIREMENTS OF N.J.S.A. 18A:18A-25 MAY BE USED.





State of New Jersey

DEPARTMENT OF THE TREASURY
DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION
33 W. STATE STREET
PO BOX 034
TRENTON, NEW JERSEY 08625-0034

REPLY TO:
TEL: (609) 943-3400
FAX: (609) 292-7651

TOTAL AMOUNT OF UNCOMPLETED CONTRACTS

(This form is to be used with the NOTICE OF CLASSIFICATION when submitting bids to the Department of Education.)

I Certify that the amount of uncompleted work on contracts is \$ \_\_\_\_\_.

The amount claimed includes uncompleted portions of all currently held contracts from all sources (public and private) in accordance with N.J.A.C. 17:19-2.13.

I further certify that the amount of this bid proposal, including all outstanding incomplete contracts does not exceed my prequalification dollar limit.



Respectfully submitted,

By \_\_\_\_\_
Name of Firm

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Business Address

\_\_\_\_\_  
Phone

Sworn to and
subscribed before me
This day of
20

Notary Public



NO MATERIAL ADVERSE CHANGE IN QUALIFICATION

**AFFIDAVIT**

I, \_\_\_\_\_ being of full age under oath depose and say:

1. I am a(n) owner, partner, shareholder or officer of the company set forth below and am duly authorized to execute this affidavit on its behalf.
2. A statement as to the financial ability, adequacy of plant and equipment, organization and prior experience of [Bidder], as required by N.J.S.A. 18A:18A-28 has been submitted to the Department of Treasury within one (1) year preceding the date of opening of bids for this contract.
3. I certify, as required by N.J.S.A. 18A:18A-32 that there has been no material adverse change in the qualification information of [Bidder] since such statement was submitted to the Department of Treasury except: \_\_\_\_\_

\_\_\_\_\_.

SEAL

\_\_\_\_\_  
SIGNATURE

\_\_\_\_\_  
TITLE

\_\_\_\_\_  
COMPANY

\_\_\_\_\_  
DATE

Sworn to and subscribed  
before me this      day  
of \_\_\_\_\_, 20 \_\_\_\_.

\_\_\_\_\_  
Notary Public

\*





HOLD HARMLESS AGREEMENT - EXHIBIT A

It is further agreed that the undersigned hereby agrees to defend, indemnify and hold harmless the Board of Education, its officers, employees, volunteers and agents, from and against all claims, damages, losses, and expenses, including reasonable attorney's fees, in case it shall be necessary to file an action, arising out of performance of the work herein, which is; 1) for personal or bodily injury, illness or death, or for property damage, including loss of use, and; 2) caused in whole or in part by

\_\_\_\_\_ (Name of Contractor's) negligent act or omission, that of a subcontractor, or that of anyone employed by them, or for whose acts contractor or subcontractor may be liable. This indemnification and agreement shall apply in all instances whether the Board of Education, its officers, employees, volunteers and/or agents is/are made a party to the action or claim or is subsequently made a party to the action by third-party in-pleading or is made a part to a collateral action arising, in whole or in part, from any of the issues emanating from the original cause of action or claim.

Full Name of Contractor: \_\_\_\_\_

Business Address: \_\_\_\_\_

Telephone Number: (\_\_\_\_) \_\_\_\_\_ Zip Code \_\_\_\_\_

Project Description: \_\_\_\_\_

Signature / Authorized Person \_\_\_\_\_

Print Name: \_\_\_\_\_

Witness Signature \_\_\_\_\_

Print Name: \_\_\_\_\_



CERTIFICATION REGARDING THE DEBARMENT, SUSPENSION, INELIGIBILITY AND  
VOLUNTARY EXCLUSION

I am \_\_\_\_\_ of the firm of \_\_\_\_\_,  
(your title) (name of your organization)  
\_\_\_\_\_  
(state the address of your organization)

**CHOOSE ONE OF THE FOLLOWING**

- ( ) A. I hereby certify on behalf of \_\_\_\_\_ that  
(name of your organization)  
  
neither it nor its principals are included on the New Jersey State Department of Labor  
and Workforce Development; Prevailing Wage Debarment List, debarment or suspended  
list, or the State of New Jersey Consolidated Debarment Report or the Federal Debarred  
Debarment List.
- ( ) B. I am unable to certify to any of the statements set forth in this  
certification. I have attached an explanation to this form.

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Type Name & Title)

\_\_\_\_\_  
(Date)

CERTIFICATION REGARDING THE DEBARMENT, SUSPENSION, INELIGIBILITY AND  
VOLUNTARY EXCLUSION

**INSTRUCTIONS FOR CERTIFICATION**

1. By signing and submitting this certification, the contracting firm is providing the certification as set out below.
2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the contracting firm knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the District may pursue available remedies including suspension and/or debarment.
3. The contracting firm shall provide immediate written notice to the District if at any time it learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
4. The terms "covered transaction", "debarred", "suspended", "ineligible", "lower tier covered transaction", "participant", "person", "primary covered transaction", "principal", and "voluntarily excluded", as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the District for assistance in obtaining a copy of those regulations.
5. The contracting firm agrees by submitting this certification that, should the covered transaction be entered into, it shall not knowingly enter into any transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction.
6. The contracting firm further agrees by submitting this certification that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion" without modification, in all subcontracts to this agreement as authorized by the District.
7. The Contractor may be debarred, suspended or disqualified from contracting and/or working on the Work if found to have committed any of the acts listed in N.J.A.C. 17:19-4.1. The Contractor shall insert in all of its contracts with subcontractors a clause stating that the subcontractor may be debarred, suspended or disqualified from contracting and/or working on the Work if found to have committed any of the acts listed in N.J.A.C. 17.19-4.1 .
8. All Bidders shall submit a sworn statement indicating whether the Bidder, at the time of the Bid, is included on the State Treasurer's, or the Federal Government's List of Debarred, Suspended or Disqualified Bidders as a result of action taken by any State or Federal Agency. The Owner shall immediately notify the State of New Jersey and the Unit of Fiscal Integrity of the Office of the Attorney General whenever it appears that a bidder is on the State Treasurer's or the Federal Government's List.

**CERTIFICATION OF NON-DEBARMENT  
FOR FEDERAL GOVERNMENT CONTRACTS**  
N.J.S.A. 52:32-44.1 (P.L. 2019, c.406)

As used herein, "Affiliate" means any entity that (1) directly, indirectly, or constructively controls another entity, (2) is directly, indirectly, or constructively controlled by another entity, or (3) is subject to the control of a common entity. An entity controls another entity if it owns, directly or individually, more than 50% of the ownership interest in that entity.

This certification shall be completed, certified to, and submitted to Delsea Board of Education prior to contract award.

<b>PART I: BIDDER INFORMATION</b>	
Individual or Organization Name ("Bidder")	
Address of Bidder	
DUNS Code (if applicable)	
CAGE Code (if applicable)	

**PART II – Identification of Affiliates:**

**Individual or Entity Owning Greater than 50 Percent of Bidder (“Parent Organization”)**

**Section A (Check the Box that applies)**

<input type="checkbox"/>	Below is the name and address of the interest holder(s) owning, directly, indirectly or constructively, as the case may be, a greater than 50 percent interest in the Bidder.
--------------------------	---

<b>Name of Individual or Organization</b>	
---	--

<b>Address</b>	
----------------	--

**OR**

<input type="checkbox"/>	No interest holder(s) owns, directly, indirectly or constructively, a greater than 50 percent interest in the Bidder.
--------------------------	---

**Part III – Identification of Affiliates:**

**Bidder-Controlled Entities (“Child Entities”)**

**Section A**

<input type="checkbox"/>	Below is the name and address of the entities in which the <b>Bidder listed in Part I</b> owns, directly, indirectly or constructively, as the case may be, a greater than 50 percent interest.
--------------------------	---

<b>Name</b>	<b>Address</b>
-------------	----------------

--	--

--	--

--	--

**\*\*Add additional sheets if necessary\*\***

**OR**

<input type="checkbox"/>	The <b>Bidder listed above in Part I</b> does not own, directly, indirectly or constructively, a greater than 50 percent interest in any other entity.
--------------------------	--

[CONTINUED NEXT PAGE]

**Part IV – Identification of Affiliates:**

**Entities under Common Control with Bidder (“Sister Entities”)**

**Section A**

Below is the name and address of all entities, **other than the Bidder listed in Part I and the Bidder-Controlled Entities listed in Part III**, of which the **Parent Organization listed in Part II** owns, directly, indirectly or constructively, as the case may be, a greater than 50 percent interest.

Name	Address

**\*\*Add additional sheets if necessary\*\***

**OR**

The **Parent Organization listed in Part II** does not own, directly, indirectly or constructively, greater than 50 percent interest in any entity other than the **Bidder listed in Part I and the Bidder-Controlled Entities listed in Part III**.

**PART V – CERTIFICATION OF NON-DEBARMENT**

I hereby certify that the **individual or organization listed above in Part I** (i.e. the “Bidder”) is not debarred by the federal government from contracting with a federal agency, **nor are any of its “Affiliates”, as defined above and identified herein in Parts II, III, and IV, so debarred.** I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that **Delsea Regional Board of Education** 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 **Delsea Regional Board of Education** to notify **Delsea Regional 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 **Delsea Regional Board of Education** , permitting **Delsea Regional Board of Education** to declare any contract(s) resulting from this certification void and unenforceable.

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



AFFIRMATIVE ACTION REQUIREMENTS

Bidder is required to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27

1. 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 web-site, for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7.
2. 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 undersigned certifies that he/she is aware of the commitment to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27 et seq. and agrees to furnish the required forms of evidence.

Subscribed and sworn to before me this

\_\_\_\_\_ day of \_\_\_\_\_, 202\_\_.

My Commission expires:

\_\_\_\_\_ Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Name and Title  
(Type or Print)



## EXHIBIT B

### 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 affectional 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 Americans 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's or subcontractor's prior experience with a construction 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 with this chapter, by complying with the hiring or scheduling procedures prescribed under (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.

(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:

## EXHIBIT B (Cont)

(1) 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;

(3) 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 and submitted promptly to 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

**EXHIBIT B (Cont)**

further, however, that the contractor or subcontractor shall not be required to employ women and minority advanced trainees and trainees in numbers which 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 ratio 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 on-the-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.

Each contractor shall submit to the public agency, prior to execution of a public agency contract a completed form AA201:

**\*\*\*\*The Board of Education recognizes the right of its employees/students to work and study in an environment that is free from sexual harassment. Immediate and appropriate action will be taken against any vendor/agent of the Board found liable for sexually harassing any employee/student.**

Note: Please sign below that you have read and understand the EEO Language. This does not fulfill your obligation to submit the required document prior signing a construction contract.

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

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

Address \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



NON-COLLUSION AFFIDAVIT

STATE OF NEW JERSEY )

COUNTY OF )

I, \_\_\_\_\_ of the City of \_\_\_\_\_ in the County of \_\_\_\_\_ and the 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 this Proposal/Bid for the **Delsea Regional High School New Fieldhouse Building and Toilet Room Addition**, and that I executed the said Bid with full authority so to do; that said bidder had not, directly 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 **Delsea Regional High School New Fieldhouse Building and Toilet Room Addition** and that all statements contained in said Bid and in this affidavit are true and correct, and made with full knowledge that the Owner relies upon the truth of the statements contained in said Bid and in the statements contained in this affidavit in awarding the contract for the said project.

I further warrant that no person or selling agency has been employed or retained to solicit or secure such contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, except bona fide employees or bona fide established commercial or selling agencies maintained by

\_\_\_\_\_  
(Name of Bidder)

\_\_\_\_\_  
Bidder's Signature

Sworn to and subscribed before me

this \_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

\_\_\_\_\_  
Notary Public of

My Commission expires \_\_\_\_\_ 20 \_\_\_\_





**APPENDIX A**  
**AMERICANS WITH DISABILITIES ACT OF 1990**  
**Equal Opportunity for Individuals with Disability**

The Contractor and the Delsea Regional 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. S12101 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 the Act. The contractor shall indemnify, protect, and save harmless the owner, its agents, servants, and employees from and against any 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 action's available to it under any other provisions of the Agreement or otherwise at law.



# 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 N.J.S.A. 19:44A-20.7) are subject to the provisions of P.L. 2005, c. 271, s.2 (N.J.S.A. 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 State, county, or municipal committee of a political party
- any legislative leadership committee\*
- 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
  - 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 \$300 per election cycle that were made during the 12 months prior to award of the contract. See N.J.S.A. 19:44A-8 and 19:44A-16 for more details on reportable contributions.

N.J.S.A. 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 Stockholder 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.**

\* N.J.S.A. 19:44A-3(s): "The term "legislative leadership committee" means a committee established, authorized to be established, or designated by the President of the Senate, the Minority Leader of the Senate, the Speaker of the General Assembly or the Minority Leader of the General Assembly pursuant to section 16 of P.L.1993, c.65 (C.19:44A-10.1) for the purpose of receiving contributions and making expenditures."



# 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 N.J.S.A. 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 N.J.S.A. 19:44A-20.26 this disclosure must include all reportable political contributions (more than \$300 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: Gloucester**

State: Governor, and Legislative Leadership Committees

Legislative District #s: 3, 4, & 5

State Senator and two members of the General Assembly per district.

**County:**

Freeholders

County Clerk

Sheriff

Surrogate

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

Clayton Borough	Logan Township	Swedesboro Borough
Deptford Township	Mantua Township	Washington Township
East Greenwich Township	Monroe Township	Wenonah Borough
Elk Township	National Park Borough	West Deptford Township
Franklin Township	Newfield Borough	Westville Borough
Glassboro Borough	Paulsboro Borough	Woodbury City
Greenwich Township	Pitman Borough	Woodbury Heights Borough
Harrison Township	South Harrison Township	Woolwich Township

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

Clayton Borough	Greenwich Township	Pitman Borough
Clearview Regional	Harrison Township	South Harrison Township
Delsea Regional High	Kingsway Regional	Swedesboro-Woolwich
Deptford Township	Logan Township	Washington Township
East Greenwich Township	Mantua Township	Wenonah Borough
Elk Township	Monroe Township	West Deptford Township
Franklin Township	National Park Borough	Westville Borough
Gateway Regional	Newfield Borough	Woodbury City
Glassboro	Paulsboro Borough	Woodbury Heights Borough

**Fire Districts (Board of Fire Commissioners):**

Deptford Township Fire District No. 1  
Franklin Township Fire District No. 1  
Franklin Township Fire District No. 2  
Franklin Township Fire District No. 3  
Franklin Township Fire District No. 4  
Franklin Township Fire District No. 5  
Harrison Township Fire District No. 1  
Washington Township Fire District No. 1  
Westville Borough Fire District No. 1





**Delsea Regional Board of Education**  
**DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN FORM**

**BID SOLICITATION/PROPOSAL TITLE** \_\_\_\_\_  
**VENDOR/BIDDER NAME** \_\_\_\_\_

Pursuant to N.J.S.A. 52:32-57, et seq. (P.L. 2012, c.25 and P.L. 2021, c.4) any person or entity that submits a bid or proposal or otherwise proposes to enter into or renew a contract must certify that neither the person nor entity, nor any of its parents, subsidiaries, or affiliates, is identified on the New Jersey Department of the Treasury's Chapter 25 List as a person or entity engaged in investment activities in Iran. The Chapter 25 list is found on the Division's website at <https://www.state.nj.us/treasury/purchase/pdf/Chapter25List.pdf>. Vendors/Bidders must review this list prior to completing the below certification. If the Director of the Division of Purchase and Property finds a person or entity to be in violation of the law, s/he shall take action as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the party.

**CHECK THE APPROPRIATE BOX**  
I certify, pursuant to N.J.S.A. 52:32-57, et seq. (P.L. 2012, c.25 and P.L. 2021, c.4), that neither the Vendor/Bidder listed above nor any of its parents, subsidiaries, or affiliates is listed on the New Jersey Department of the Treasury's Chapter 25 List of entities determined to be engaged in prohibited activities in Iran.

OR

I am unable to certify as above because the Vendor/Bidder and/or one or more of its parents, subsidiaries, or affiliates is listed on the New Jersey Department of the Treasury's Chapter 25 List. I will provide a detailed, accurate and precise description of the activities of the Vendor/Bidder, or one of its parents, subsidiaries or affiliates, has engaged in regarding investment activities in Iran by completing the information requested below.

Entity Engaged in Investment Activities \_\_\_\_\_  
Relationship to Vendor/ Bidder \_\_\_\_\_  
Description of Activities \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Duration of Engagement \_\_\_\_\_  
Anticipated Cessation Date \_\_\_\_\_

*Attach Additional Sheets If Necessary*

**CERTIFICATION**

I, the undersigned, certify that I am authorized to execute this certification on behalf of the Vendor/Bidder, that the foregoing information and any attachments hereto, to the best of my knowledge are true and complete. I acknowledge that the State of New Jersey is relying on the information contained herein, and that the Vendor/Bidder is under a continuing obligation from the date of this certification through the completion of any contract(s) with the State to notify the State 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. If I do so, I will be subject to criminal prosecution under the law, and it will constitute a material breach of my agreement(s) with the State, permitting the State to declare any contract(s) resulting from this certification void and unenforceable.

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Print Name and Title**

**This form is to be completed, certified and submitted prior to the award of contract.**



PERFORMANCE AND PAYMENT BOND

Bond no. \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS, That we, \_\_\_\_\_,  
as Principal, and \_\_\_\_\_,  
a corporation duly authorized to do business in the State of New Jersey, as Surety (the Surety), are hereby held and firmly bound unto

**Delsea Regional Board of Education  
242 Fries Mill Road  
Franklinville, New Jersey 08322**

(hereinafter called the Obligee) in the penal sum of \_\_\_\_\_

\_\_\_\_\_ Dollars, (\$ \_\_\_\_\_),  
for the payment of which will and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, THAT WHEREAS, The above named Principal did, on the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, enter into a Contract with the Obligee for **Delsea Regional High School New Fieldhouse Building and Toilet Room Addition**; which said Contract is made a part of this, the Bond, the same as though set forth herein:

NOW THEREFORE, If the said \_\_\_\_\_ shall well and faithfully do and perform the things agreed by \_\_\_\_\_ to be done and performed in accordance to the terms of said Contract, and shall pay all lawful claims of subcontractors, materialmen, laborers, persons, firms or corporations for labor performed or materials, provisions or other supplied, fuels, oils, implements, or machinery furnished, used or consumed in the carrying forward, performing or completing of said Contract as required by N.J.S.A. 2A:44-143, we agreeing and assenting that this undertaking shall be for the benefit of any subcontractors, materialmen, laborers, persons, firms or corporations having a just claim as required by N.J.S.A. 2A:44-143, as well as for the obligee 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 stipulates and agrees that no modifications, omissions or additions in or to the terms of the said Contract or in or to the Drawings or Specifications therefor shall in any way affect the obligation of said surety on its Bond.

PERFORMANCE AND PAYMENT BOND

THIS BOND is given in compliance with the requirements of the statutes of the State of New Jersey in respect to bonds of contractors on public works. Revised statutes of New Jersey, 1937 Sections 2A:44-143-147, and amendments thereof, and liability hereunder are limited as in said statutes provided.

\_\_\_\_\_  
Principal Name

Witness:

\_\_\_\_\_

By:

\_\_\_\_\_  
Principal Signature

\_\_\_\_\_  
Surety Name

By:

\_\_\_\_\_  
Surety Signature

\_\_\_\_\_  
As to Surety

MAINTENANCE BOND

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

\_\_\_\_\_

as principal, and \_\_\_\_\_

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 held and firmly bound unto the \_\_\_\_\_

\_\_\_\_\_

as Owner, in the penal sum of \_\_\_\_\_

\_\_\_\_\_

(100% of the Final Contract Amount)

for payment of which, well and truly to be made, we hereby, jointly, and severally, bind ourselves, our heirs, executors, administrators, successors and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, That whereas the above named principal did on the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_, enter into a Contract with the Owner for \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Project 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 two (2) 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 two (2) 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)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Surety) (Seal)

\_\_\_\_\_  
(Witness)

\_\_\_\_\_  
(Title)

# STATE OF NEW JERSEY

DEPARTMENT OF LABOR & WORKFORCE DEVELOPMENT  
CONSTRUCTION EEO COMPLIANCE MONITORING PROGRAM

FORM AA-201  
Revised 11/11

## INITIAL PROJECT WORKFORCE REPORT CONSTRUCTION

Official Use Only

Assignment

Code

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

1. FID NUMBER		2. CONTRACTOR ID NUMBER		5. NAME AND ADDRESS OF PUBLIC AGENCY AWARDED CONTRACT Name: Address:					
3. NAME AND ADDRESS OF PRIME CONTRACTOR  (Name)  (Street Address)  (City) (State) (Zip Code)				CONTRACT NUMBER		DATE OF AWARD		DOLLAR AMOUNT OF AWARD	
4. IS THIS COMPANY MINORITY OWNED [ ] OR WOMAN OWNED [ ]				6. NAME AND ADDRESS OF PROJECT Name: Address:  COUNTY				7. PROJECT NUMBER	
				8. IS THIS PROJECT COVERED BY A PROJECT LABOR AGREEMENT (PLA)? YES <input type="checkbox"/>					

9. TRADE OR CRAFT	PROJECTED TOTAL EMPLOYEES				PROJECTED MINORITY EMPLOYEES				PROJECTED PHASE - IN DATE	PROJECTED COMPLETION DATE
	MALE		FEMALE		MALE		FEMALE			
	J	AP	J	AP	J	AP	J	AP		
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										

I hereby 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)

(Area Code)

(Telephone Number)

(Ext.)

(Date)

**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**



**DRAFT AIA<sup>®</sup> Document A101<sup>™</sup> - 2017**

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

**AGREEMENT** made as of the **00** day of **MONTH** in the year Two Thousand Twenty-Two  
*(In words, indicate day, month and year.)*

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

Delsea Regional Board of Education  
242 Fries Mill Road  
Franklinville, New Jersey 08322

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

**NAME OF CONTRACTOR**  
**ADDRESS OF CONTRACTOR**  
**CITY, STATE ZIP**

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

Delsea Regional High School  
New Fieldhouse Building and Toilet Room Addition  
242 Fries Mill Road  
Franklinville, NJ 08322

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

Garrison Architects  
713 Creek Road  
Bellmawr, New Jersey 08031

The Owner and Contractor agree as follows.

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

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

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.



**ELECTRONIC COPYING** of any portion of this AIA<sup>®</sup> Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
- 5 PAYMENTS
- 6 DISPUTE RESOLUTION
- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS

**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 and as outlined in Specification Section 01010-Summary of Work
- A date set forth in a notice to proceed issued by the Owner.
- Established as follows:  
*(Insert a date or a means to determine the date of commencement of the Work.)*

All construction preparation work, project startup, submittals, schedules, approvals, procurement, coordination and other preparatory tasks must commence immediately upon receipt of the Notice to Proceed or the date of the fully executed Owner/Contractor Contract, whichever comes first. The Awarded Contractor must be fully prepared to deliver and install all materials and equipment on the first day of the scheduled on-site Construction period.

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

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

§ 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.)

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

[ X ] By the following date: August 18, 2023 – TIME IS OF THE ESSENCE

§ 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: NOT APPLICABLE

§ 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 Dollars (\$ ), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates – See Bid Form Part B - Alternates

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

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement. NOT APPLICABLE

§ 4.3 Allowances, if any, included in the Contract Sum:

(Identify each allowance.)

Item

A. CASH ALLOWANCE

Price

\$50,000.00

§ 4.4 Unit prices, if any: NOT APPLICABLE.

(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

The Contractor understands and agrees that all work must be performed in an orderly and closely coordinated sequence so that the dates for Substantial Completion and Final Completion are met. TIME IS OF THE ESSENCE.

If the Contractor fails to complete his work or fails to complete a portion of his work and therefore not achieve Substantial Completion and/or Final Completion on the respective dates required, he shall pay the Owner, as liquidated damages and not as a penalty, Two Thousand Five Hundred Dollars (\$2,500.00) per day, which is agreed upon as a reasonable and proper measure which the Owner will sustain each calendar day by failure of the Contractor to complete work within the stipulated time for the milestone dates.

The Owner will suffer significant financial loss if the project is not substantially complete on time. Liquidated Damages will be assessed if the Project is not substantially complete by **August 18, 2023**. The Contractor (and the Contractor's Surety) shall be liable for and pay to the Owner the sum of \$2,500.00 stipulated and fixed, agreed as liquidated damages for each calendar day of delay until the work is substantially complete.

Final Completion must be reached Thirty (30) days following the date fixed in the contract for Substantial Completion. The Contractor (and the Contractor's Surety) shall be liable for and pay to the Owner the sum of \$2,500.00 stipulated and fixed, agreed as liquidated damages for each calendar day of delay until the work is finally complete.

Substantial Completion will be determined by the Architect as defined in paragraph 9.8.1 of the General Conditions.

For damage occurring at the time of delay, the Owner may retain the amount due to him under this clause from any payments due to the Contractor. Final Completion and Substantial Completion liquidated damages shall be stacked and are not concurrently imposed.

**§ 4.6 Other:**

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

« »

**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. An application for Payment shall include all work performed in one calendar month.

**§ 5.1.2** Contractor shall submit a Pencil Copy / Rough Draft of the Application for Payment to the Architect for review no later than the 15 calendar days prior to the first Friday of the month payment is requested from Owner.

Architect will review the Pencil Copy / Rough Draft of the Application for Payment and return to the Contractor within five (5) calendar days from their receipt of same.

**§ 5.1.3 Certified Application for Payment.**

.1. Within three (3) calendar days after receipt of accepted Pencil / Rough Draft of the Application for Payment the Contractor shall submit an electronic copy of the Payment to the Architect for signature.

.2. The Architect shall sign the Certified Application for Payment within five (5) calendar days upon receipt and transmit it to the Owner electronically. (Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.3.1 The form for Applications for Payment shall be a notarized AIA Document G702, Application and Certification for Payment, supported by AIA document G703 Continuation Sheets. Each Application for Payment must be accompanied by one (1) set of Certified Payroll Records for the period covered by the Application. The payroll records shall indicate the proper classification of employees and the payment of overtime, if any. These records shall include each Contractor's subcontractor's certified payroll. Payment will not be authorized if the required payroll records have not been submitted.

§ 5.1.3.2 All Applications for Payment, Certified Payroll Records and Manning Reports shall include the relevant purchase order number and project number.

§ 5.1.3.3 Pursuant to N.J.S.A. 2A:30A-1, et seq. ("the Act"), the Owner is not required to approve the Contractor's Application for Payment until the next scheduled public meeting of the Board of Education following the Owner's receipt of the Architect's Certificate for Payment. Under said Act, the Owner shall not make payment to the Contractor for the payment amount until the Owner's subsequent payment cycle following its approval of the Application for Payment.

§ 5.1.3.4 Pursuant to the above Act, if a payment due pursuant to the provisions herein is not made in a timely manner, the Owner shall be liable for the amount of money owed under the Contract, plus interest at a rate equal to the prime rate plus one percent (1%), notwithstanding anything to the contrary in the Contract Documents. Interest on amounts due pursuant to the Act shall be paid to the prime Contractor for the period beginning on the day after the required payment date and ending on the day on which the check for payment is received by the Contractor.

§ 5.1.3.5 Disputes regarding whether a party has failed to make payments required by the Act must be submitted to a process of alternative dispute resolution, notwithstanding anything to the contrary in the Contract Documents. Alternative dispute resolution permitted by the Act shall apply to disputes over payment only and shall not apply to disputes concerning any other matters that may arise under or from this Contract. Any civil action brought to collect payments shall be conducted in Gloucester County, State of New Jersey, and the prevailing party shall be awarded reasonable costs and attorneys' fees. See Article 6 of this Agreement regarding Claims and Disputes.

§ 5.1.4 The Architect may decide to disapprove an Application for Payment, or withhold payment, in whole or in part, to the extent reasonably necessary to protect the Owner if, in the Architect's opinion, the representations as described in Section 5.1.4.1 below cannot be made to the Owner. If the Architect withholds a Certificate for Payment, the Architect will notify the Contractor and Owner as provided in Article 5 hereof. The Architect may also decide to withhold certifying payment in whole or in part, because of subsequently discovered evidence or subsequent observations, to such extent as may be necessary to protect the Owner from loss because of:

1. Defective Work which has not been remedied;
2. Third party claims filed or reasonable belief probable filing of such claims;
3. Failure of the Contractor to make payments properly to vendors, subcontractors or for labor, materials and equipment;
4. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract sum;
5. Damage to the Owner or another 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. Failure to carry out the Work in accordance with the Contract Documents;
8. Avoidable delay in the progress of the Work;
9. Deliberate delay in the submission for approval of names of Subcontractors, material men, sources of supply, shop drawings and samples;
10. Failure to maintain the Project Site in a safe and satisfactory condition in accordance with good construction practices as recommended by the Architect after consultation with the Contractor; and
11. Failure to submit updates as requested by the District or as required by the General Conditions, attached hereto.

When the foregoing reasons for withholding payment are resolved, certification will be made for amounts previously withheld in the manner set forth in Section 5.1.3 above.

§ 5.1.4.1 The issuance of a separate Certificate for Payment will constitute representations made separately by the Architect to the Owner, based on its individual observations at the Site and the data comprising the Application for Payment submitted by the Contractor, that the Work has progressed to the point indicated and that, to the best of the Architect's knowledge, information and belief, quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to minor deviations from the Contract Documents correctable prior to completion and to specific qualifications expressed by the Architect. The issuance of a separate Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a separate 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 the Contractor's construction means, methods, techniques, sequences or procedures; (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 5.1.4.2 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect promptly, 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™-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:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .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:

- .1 The aggregate of any amounts previously paid by the Owner;
- .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;
- .4 For Work performed or defects discovered since the last payment application, any amount for which 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.)*

Retainage shall be determined as follows: Pursuant to N.J.S.A. 18A:18A-40.3, the Owner will withhold two percent (2%) of the amount due on each partial payment when the outstanding balance of the Contract exceeds Five Hundred Thousand Dollars (\$500,000.00). The Owner will withhold five percent (5%) of the amount due on each partial payment when the outstanding balance of the Contract is Five Hundred Thousand Dollars (\$500,000.00) or less. Retainage shall be withheld until the Owner approves the Architect's determination that the work has been satisfactorily completed and no unsettled claims exist. The final acceptance shall not be binding or conclusive upon the Owner should it subsequently discover that the contractor has supplied inferior material or workmanship or has departed from the terms of his contract. Should such a condition appear the Owner shall have the right, notwithstanding final acceptance and payment, to cause the work to be properly done in accordance with the drawings and specifications at the cost and expense of the contractor.

§ 5.1.7.1.1 The following items are not subject to retainage: **NOT APPLICABLE**

*(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.)*

« »

§ 5.1.7.3 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

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct 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.)*

Pursuant to N.J.S.A. 2A:30A-2 (c), if a payment due pursuant to the provisions herein is not made in a timely manner, the Owner shall be liable for the amount of money owed under the Contract, plus interest at a rate equal to the prime rate plus one percent (1%), notwithstanding anything to the contrary in the Contract Documents. Interest on amounts due pursuant to the Act shall be paid to the prime Contractor for the period beginning on the day after the required payment date and ending on the day on which the check for payment is received by the Contractor.

**ARTICLE 6 DISPUTE RESOLUTION**

**§ 6.1 Initial Decision Maker**

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker. *(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)*

« »  
« »  
« »  
« »

**§ 6.2 Binding Dispute Resolution**

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

*(Check the appropriate box.)*

- Arbitration pursuant to Section 15.4 of AIA Document A201–2017
- Litigation in Superior Court of New Jersey in Gloucester County. New Jersey law will apply.
- Other *(Specify)*

« »

**ARTICLE 7 TERMINATION OR SUSPENSION**

**§ 7.1** The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

**§ 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.

**§ 8.2** The Owner’s representative:



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

**Joseph M Collins, CPA**  
**School Business Administrator/ Board Secretary**  
Delsea Regional School District  
242 Fries Mill Road  
Franklinville, NJ 08322

§ 8.3 The Contractor's representative:  
(Name, address, email address, and other information)

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

**§ 8.5 Insurance and Bonds**

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A201™-2017 and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A201™-2017 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™-2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below: **NOT APPLICABLE**

(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. Payments due and unpaid under the Contract shall in no instance bear interest, except as required by law pursuant to section 5.1.3.4 of this Agreement.
2. The contractor shall ensure that the Project Site is maintained in a clean and safe condition at all times. If the contractor fails to keep the Project Site in a clean and safe condition, said failure shall result in the following:
  - a. All claims resulting from the Contractor's failure shall be the Contractor's sole responsibility;
  - b. Said failure shall constitute an act of default and a substantial breach of the Contract giving the Owner remedies under the Contract Documents; and
  - c. The Owner shall have the right to withhold any payments until the Contractor cures its failure.

Failure to cure shall authorize the Owner to withhold any Certifications for Payment until such time as the Contractor has rectified same. Further, if the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

3. The within contract shall be governed by and interpreted pursuant to the laws of the State of New Jersey.

4. 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., and all provisions regarding equal employment opportunity, N.J.S.A. 10:5-31, et seq., N.J.A.C. 17:27-1.1, and N.J.A.C. 6A:7-1.8. The Owner and the Contractor guaranty to afford equal opportunity in the performance of this Contract in accordance with an affirmative action program approved by the State Treasurer and shall provide the documents required for this Project.
5. To perform the services provided for herein, the Contractor and its prime subcontractors shall be prequalified/classified by the New Jersey Department of Treasury, Division of Property, Management and Construction. The failure to possess or obtain such classifications shall result in the immediate termination of this Agreement.
6. The Contractor represents that, to the best of its knowledge, information and belief, none of its employees in engaged in conduct that constitutes a conflict of interest under, or a violation of, the School Ethics Act, N.J.S.A. 18A:12-21, et seq., and N.J.A.C. 6A:28-1.1, et seq.
7. Before final payment on the contract is made by Owner, the Contractor shall submit an accurate list and the proof of business registration in the State of New Jersey of each subcontractor or supplier used in the fulfillment of the contract, or shall attest that no subcontractors were used.
8. For the term of the Agreement, the Contractor, any subcontractor and each of their affiliates, so designated pursuant to N.J.S.A. 52:32-44(g)(3), shall collect and remit to the New Jersey Director of the Division of Taxation in the Department of Treasury, the use tax due pursuant to the Sales and Use Tax Act, N.J.S.A. 52:32B-1, et seq., on all of their sales of tangible personal property delivered into the State of New Jersey, regardless of whether the tangible personal property is intended for a contract with a contracting agency. For purposes herein, "affiliate" shall mean any entity that: (a) directly, indirectly or constructively controls another entity; (b) is directly, indirectly or constructively controlled by another entity; or, (c) is subject to the control of a common entity. For purposes of the immediately preceding sentence, an entity controls another entity if it owns, directly or indirectly, more than fifty percent (50%) of the ownership interest of that entity.
9. It is the obligation of the Contractor to provide a full and complete copy of all insurance policies held by it at the Contractor's sole expense, upon reasonable request by the Owner, in the amounts specified in the Bid Documents ( see Article 11 of modified AIA Document A201-2017 General Conditions of the Contract for Construction). The Contractor's failure to obtain or maintain adequate insurance coverage shall result in the immediate termination of this Agreement. The Owner will have the right to request copies of the Contractor's insurance policies or any part thereof for the duration of the contract period.
10. This Agreement and the General Conditions of the Contract as modified or supplemented in writing, shall control in the case of conflict between these documents and the Project Specifications, the Project Manual and any other exhibits incorporated by reference into this Agreement in Article 9 herein.
11. In claims against any person or entity indemnified under this Agreement 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 this Agreement shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.
12. Contracts between the Contractor and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by the Contract Documents, assumes toward the Owner and its consultants.

13. Unpaid Lien Balance

- a. To the fullest extent permitted by law, the Contractor shall not suffer or permit any Construction Lien or Notice of Unpaid Balance and Right to File Lien ("NUB") to be filed or to remain of record as a claim against the Work or the Project or against any monies due or to become due for any work performed or services, materials or equipment furnished by to or on behalf of Contractor or any of its Subcontractors or Sub-subcontractors or any suppliers to Contractor or its Subcontractors ("Suppliers"), nor shall Contractor suffer or permit any such Construction Lien or NUB to be so filed because of any claim or demand against, or any action or non-action of the Contractor or any Subcontractors, Sub-subcontractors or Suppliers.
- b. In the event that any such Subcontractor, Sub-subcontractor or Supplier or any other party with whom the Contractor has entered into a relationship to perform any portion of the Work, files a Construction Lien and/or NUB arising out of or in connection with the Work or any work, services, material or equipment associated with this Agreement (and provided that Owner is not then in breach of its monetary obligation to Contractor for the work, services, material or equipment which is the subject of the Construction Lien and/or NUB under the Contract Documents), Contractor shall within ten (10) days of receipt of notice of said Construction Lien or NUB, cause same to be discharged, satisfied and/or bonded and, in default thereof, Owner shall have the right to bond said Construction Lien and/or NUB or otherwise discharge same (provided that Owner shall only pay and satisfy any Construction Lien or NUB if, within twenty (20) days from the earlier of (a) service of the lien claim on Contractor or (b) written notice from the owner of the Construction Lien or NUB, Contractor or Subcontractor (where applicable) has not notified Owner in writing that the claimant is not owed the monies claimed and the reason therefor, and, thereafter, to retain out of any payment then due or thereafter to become due to Contractor, 110% of the amount of such lien, all of which the Contractor agrees to fully reimburse Owner out of such contract funds.
- c. Should a Construction Lien and/or NUB be filed by a Subcontractor or Supplier or other party with whom the Contractor has entered into a relationship to perform any portion of the Work or any additional or extra work, after all payments have been made to Contractor under this Agreement, and should Contractor fail to abide by the terms of this Section, Contractor shall refund to Owner all monies that the latter may be compelled to pay to bond, discharge and/or defend the Construction Lien and/or NUB. Any such Construction Lien and/or NUB, until satisfied, bonded off or discharged or withdrawn, shall preclude any and all claim or demand for payment whatsoever by the Contractor. The Contractor further agrees to indemnify, defend, protect and save harmless Owner and the Indemnities from and against any and all claims, actions, fines and penalties brought or imposed or judgments rendered thereon, or any loss, damages, liability, costs and expenses, including legal fees and disbursements, which Owner may sustain or incur as a consequence of the Contractor's failure to comply with the terms of this Section. The failure of the Contractor to satisfy, discharge and/or bond a Construction Lien and/or NUB filed by a Subcontractor, Sub-subcontractor or Supplier within twenty (20) days of notice thereof shall constitute a material breach of the Contract by the Contractor.

14. In the event the Contractor fails or refuses to discharge any NUB, Construction Lien, lis pendens, or other encumbrance or cloud on title, for Work for which the Contractor has been paid, within the timeframe and in the manner set forth in this Section, the Contractor shall be liable to the Owner and Indemnities for the full amount of the NUB, Construction Lien, lis pendens or other encumbrance or cloud on title and all direct damages sustained by the Owner as a result thereof, as well as, all attorneys' fees and costs incurred by the Owner or any Indemnitee in connection therewith. In such event, in addition to the Owner's right to recover the foregoing damages, attorneys' fees and costs from the Contractor and in addition to all of its other common law and statutory rights, the Owner shall be entitled to: (a) declare a material breach of the Contract and terminate the Contract for default pursuant to Section 14 of the A201 and withhold payment to Contractor; (b) withhold an amount from the Contractor equal to 110 percent of the amount claimed in the NUB or Construction Lien (c) pay the amount set forth in the NUB or Construction Lien and deduct this amount from amounts otherwise owed to the Contractor under the Contract; and/or (d) obtain a discharge of the NUB and/or Construction Lien., in any matter permitted under the New Jersey Construction Lien Law, and deduct all costs incurred in connection therewith from amounts otherwise owed to the Contractor under the Contract. The foregoing remedies shall be cumulative. In exercising its rights and remedies set forth in this Section the Owner shall not be required to present a claim in accordance with the procedure or timeframe set forth in Article 6.

15. Assignments/ Subcontracting: The Parties agree that there will be no Assignment and/or subcontracting of this Work without prior written consent and approval of the Owner.

**ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS**

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™-2017, Exhibit A, Insurance and Bonds – **NOT APPLICABLE – SEE THE A201-2017**
- .3 AIA Document A201™-2017, General Conditions of the Contract for Construction as modified and incorporated into the Bid Specifications.
- .4 AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below: **NOT APPLICABLE**  
*(Insert the date of the E203-2013 incorporated into this Agreement.)*
- .5 Drawings – **SEE THE ATTACHED INDEX**
- .6 Specifications **SEE THE ATTACHED INDEX**
- .7 Addenda, if any:

Number	Date	Pages

- .8 Other Exhibits:

*(Check all boxes that apply and include appropriate information identifying the exhibit where required.)*

AIA Document E204™-2017, Sustainable Projects Exhibit, dated as indicated below:  
*(Insert the date of the E204-2017 incorporated into this Agreement.)*

The Sustainability Plan:

Supplementary and other Conditions of the Contract: **THESE ARE INCORPORATED DIRECTLY INTO THE AIA A201.**

.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™-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.)*

Mandatory Equal Employment Opportunity Language, annexed hereto and made a part hereof

New Jersey Department of Labor and Workforce Development Prevailing Wage Rate Determination, or the Davis-Bacon Prevailing Wage Rates, whichever is applicable.

The Drawings, Specifications, Addenda and Contractor's Bid Submission shall be considered as part of this Contract

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

\_\_\_\_\_  
OWNER (Signature)

« »( )

(Printed name and title)

\_\_\_\_\_  
CONTRACTOR (Signature)

« »( )

(Printed name and title)



 **AIA<sup>®</sup> Document A201<sup>™</sup> – 2017*****General Conditions of the Contract for Construction***

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

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

### § 1.1.1 The Contract Documents

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

*§1.1.1.1 The Contract Documents shall include the Bidding Requirements, including, but not be limited to advertisement or Invitation to Bid, Instructions to Bidders, the Contractor's Bid Proposal Form and other bidding forms, Addenda or portions of the Addenda relating to any Bidding Documents, Payment and performance Bonds, Certificates of Insurance, the General Terms and Conditions, Drawings and Specifications and any other documents enumerated in the Owner-Contractor Agreement 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 and that questions regarding the bid documents and any interpretation(s) regarding same have been asked by the contractor, in the form and manner required in the instructions to bidders.*

### § 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 It is strongly encouraged for the Contractor 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.

**§ 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 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.*
- .2 Contractor shall coordinate his Work with the Work of others and shall be responsible for the coordination work, so that interference between mechanical, electrical and other work and architectural and structural work does not occur.*
- .3 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 *which include the Instructions to Bidders, the Advertisement and forms required at the time of and after the receipt of the bids.*

#### **§ 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. *The Architect shall be the Initial Decision Maker.*

#### **§1.1.9 Knowledge**



*Knowledge. The terms "knowledge," "recognize," and "discover," their respective derivatives, and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize), and discovers (or should discover) in exercising the care, skill, and diligence required by the Contract Documents. Analogously, the expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a Contractor generally familiar with the Project, the type of construction work required, and the circumstances attendant to the Project site and by a Contractor exercising the care, skill, and diligence required of the Contractor by the Contract Documents.*

## **§ 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.*

- .1 Where on any drawings a portion of the work is drawn out and the remainder is indicated in outline, the parts drawn out shall apply also to other like portions of the work.*
- .2 Where detail is indicated by starting only, such detail shall be continued throughout the courses or parts in 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.*
- .4 Any discrepancies or questions as to the application of, and interpretations related to 1.2.1.1, shall be referred to the Architect for adjustment before any work affected thereby has been performed.*

*§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 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 ambiguity or discrepancy subject to any Architect's interpretation, 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, all determinations as to equality of a proposed product or material shall be at the discretion of the Architect and/or the Owner.*

*.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 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 Drawing details and Specifications, bidder during 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 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, Sub-subcontractors, 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. ***Drawings, specifications and other documents, including those in electronic form, prepared by the Architect and the Architect's consultants are Instruments of Service for use solely with respect to this Project, except that Owner shall be authorized to use any Instruments of Service for future additions or alterations to this Project or for other Projects. The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service and shall retain all common law, statutory and other reserved rights, including copyrights.***

§ 1.5.3 ***The Contractor will be furnished free of charge two (2) sets of signed and sealed drawings and specifications. If more documents are required by the Contractor, the additional documents may be obtained at the cost of \$2.00 per sheet and \$100.00 per specification.***

#### § 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™ 2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.~~

#### § 1.8 Building Information Models 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™ 2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™ 2013, Project Building Information Modeling Protocol Form, 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.~~

#### § 1.9 EXECUTION OF CONTRACT DOCUMENTS

§ 1.9.1 ***The Contract Documents shall be signed by the Owner and Contractor. If either the Owner or Contractor or both do not sign all the Contract Documents, the Architect shall identify such unsigned Documents upon request. The Agreement shall be signed in not less than triplicate by the Owner and Contractor.***

**§ 1.9.2 Execution of the Contract by the Contractor is a representation that said Contract Documents are full and complete, are sufficient to have enabled the Contractor to determine the cost of the Work therein to enter into the Contract and that the Contract Documents are sufficient to enable it to construct the Work outlined therein, and otherwise to fulfill all its obligations hereunder, including, but not limited to, Contractor's obligation to construct the Work for an amount not in excess of the Contract Sum on or before the date(s) of Substantial Completion established in the Agreement. The Contractor further acknowledges and declares that it has visited and examined the site, examined all physical, legal, and other conditions affecting the Work and is fully familiar with all of the conditions thereon and thereunder affecting the same. In connection therewith, Contractor specifically represents and warrants to Owner that it has, by careful examination, satisfied itself as to: (1) the nature, location and character of the Project and the site, including, without limitation, the surface and subsurface conditions of the site and all structures and obstructions thereon and thereunder, both natural and man-made, and all surface and subsurface water conditions of the site and the surrounding area; (2) the nature, location, and character of the general area in which the Project is located, including without limitation, its climatic conditions, available labor supply and labor costs, and available equipment supply and equipment costs; and (3) the quality and quantity of all materials, supplies, tools, equipment, labor, and professional services necessary to complete the Work in the manner and within the cost and time frame required by the Contract Documents. In connection with the foregoing, and having carefully examined all Contract Documents, as aforesaid, and having visited the site, the contractor acknowledges and declares that it has no knowledge of any discrepancies, omissions, ambiguities, or conflicts in said Contract Documents and that if it becomes aware of any such discrepancies, omissions, ambiguities, or conflicts, it will promptly notify Owner and Architect of such fact.**

**§ 1.9.3 The Contract Documents include all items necessary for the proper execution and completion of the Work by the Contractor. The Work shall consist of all items specifically included in the Contract Documents as well as all additional items of work which are reasonable inferable from that which is specified in order to complete the Work in accordance with the Contract Documents. The Contract Documents are complementary, and what is required by any one Contract Document shall be as binding as if required by all. Any differences between the requirements of the Drawings and the Specifications or any differences noted within the Drawings themselves or within the Specifications themselves have been referred to the Owner and Architect by Contractor prior to the submission of bids and have been clarified by an Addendum issued to all bidders.**

**If any such differences or conflicts were not called to the Owner's and Architect's attention prior to submission of bids, the Architect shall decide which of the conflicting requirements will govern based upon the most stringent of the requirements, and, subject to the approval of the Owner, the Contractor shall perform the Work at no additional cost and/or time to the Owner in accordance with the Architect's decision. Work not covered in the Contract Documents will not be required unless it is consistent therewith and is reasonable inferable therefrom as being necessary to produce the intended results.**

**1.9.3.1 The term "reasonably inferable" includes work necessary to "provide" work indicated or specified, as defined in section: Definitions and Standards; that is: furnish and install, complete, in place and ready for use.**

**1.9.3.2 Details referenced to portions of the Work shall apply to other like portions of the Work not otherwise detailed.**

**1.9.3.3 The Contractor shall request, from the Architect/Engineer's interpretation of apparent discrepancies, conflicts, or omissions in the Specifications and Drawings. Subcontractors shall forward such requests through the Contractor. Such requests, and the Architect/Engineer's interpretation, shall be in written form; other forms of communications shall be used to expedite resolution of concerns, but will not be binding.**

*§1.9.4 Explanatory notes shall take precedence over conflicting drawn note indications. Large scale drawings shall take precedence over small scale drawings. Figured dimensions shall take precedence over scaled measurements. Should contradictions be found, the Architect shall determine which indication is correct.*

*§1.9.5 When more than one material, brand, or process is specified for a particular item of Work, the choice shall be the Contractor's. Contractor may, after notifying the Architect and Owner, select the one it considers to be the best. Approval by Architect or Owner of materials, suppliers, processes, or Subcontractors does not imply a waiver of any Contract requirements including, without limitation, Contractor's warranty.*

*§1.9.6 In all cases, the details, drawings, and specifications shall be checked with existing conditions and with work in place, and variations, if any, shall be referred by the Contractor to the Architect for adjustment, as the Contractor will be responsible for the fit or work in place.*

*§1.9.7 When a profile, section or other finished condition is shown, furring or other method of obtaining such finished conditions shall be provided. The drawings may show work fully drawn out or only a portion thereof, the remainder being in outline. The drawn-out portions apply to other like or similar places.*

*§1.9.8 Where it is required in the specifications that materials, products, processes, equipment, or the like be installed or applied in accordance with manufacturers' instructions, directions, or specifications, or words to this effect, it shall be construed to mean that said application or installation shall be in strict accordance with printed material concerned for use under conditions similar to those at the job site. Three copies of such instructions shall be furnished to the Architect and his written approval thereof obtained before work is begun.*

*§1.9.9 Any material specified by reference to the number, symbol, or title of a Commercial Standard, Federal Specification, ASTM Specification, trade association standard, or other similar standards, shall comply with the requirements in the latest revision thereof and any amendments or supplements thereto in effect one month prior to the date on which bids are opened and read, except as limited to type, class, or grade, or modified in such reference. The standards referred to, except as modified in the specifications, shall have full force and effect as though printed in the specifications. The Architect will furnish upon request information as to how copies of the standards referred to may be obtained.*

## **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**

**§ 2.2.1** Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

~~§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, 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 start-up, plus interest as provided in the Contract Documents.~~

~~§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.~~

~~§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.~~

### § 2.3 Information and Services Required of the Owner

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

§ 2.3.2 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.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work. *The furnishing of these surveys and the legal description of the site shall not relieve the Contractor from its duties under the Contract Documents. Neither Owner nor the Architect shall be required to furnish Contractor with any information concerning subsurface characteristics, utilities or conditions of the areas where the Work is to be performed. When the Owner or Architect has made investigations of subsurface characteristics or conditions of the areas where the Work is to be performed, such investigations, if any, were made solely for the purposes of Owner's study and Architect's design. Neither such investigations nor the records thereof are a part of the Contract between Owner and Contractor. To the extent such investigations or the records thereof are made available to Contractor by the Owner or Architect, such information is furnished solely for the convenience*

*of Contractor. Neither Owner nor Architect assumes any responsibility whatsoever in respect of the sufficiency or accuracy of the investigations thus made, the records thereof, or of the interpretations set forth therein or made by the Owner or Architect in its use thereof, and there is no warranty or guaranty, either express or implied, that the conditions indicated by such investigations or records thereof are representative of those existing throughout the areas where the Work is to be performed, or any part thereof, or that unforeseen developments may not occur, or that materials other than or in proportions different from those indicated may not be encountered. The Contractor shall undertake such further investigations and studies as may be necessary or useful to determine subsurface characteristics and conditions. In connection with the foregoing, Contractor shall be solely responsible for locating (and shall locate prior to performing any Work) all utility lines, telephone company lines and cables, sewer lines, water pipes, gas lines, electrical lines, including, without limitation, all buried pipelines and buried telephone cables and shall perform the Work in such a manner so as to avoid damaging any such lines, cables, pipes, and pipelines.*

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

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2 *and 1.5.3.*

#### § 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, *or fails or refuses to provide a sufficient amount of properly supervised and coordinated labor, materials, or equipment so as to be able to complete the Work within the Contract Time or fails to remove and discharge (within ten days) any lien filed upon Owner's property by anyone claiming by, through, or under Contractor, or disregards the instructions of Architect or Owner when based on the requirements of the Contract Documents,* the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, ~~except to the extent required by Section 6.1.3.~~

§ 2.4.1 *The Owner shall have the authority to immediately correct, service, repair, replace or otherwise make operational any component of their facilities including equipment if in the sole discretion of the owner the damaged component is a threat to education, safety or security. The Owner is obligated to put the Contractor on notice of the issue threatening education, safety or security, and the Owner's intent to remedy immediately with other resources and to back charge the Contractor for the cost of said service, but there are no notice provisions required for the corrective actions necessary to protect the Owner.*

#### § 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~~ *seven-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 *and/or his/her Surety* shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

**§ 2.5.1** *The Owner shall have the authority to immediately correct, service, repair, replace or otherwise make operational any component of their facilities including equipment if in the sole discretion of the owner the damaged component is a threat to education, safety or security. The Owner is obligated to put the Contractor on notice of the issue threatening education, safety or security, and their intent to remedy immediately with other resources and to back charge the contractor for the cost of said service, but there are no notice provisions required for the corrective actions necessary to protect the Owner. The rights stated in this Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (i) granted in the Contract Documents, (ii) at law or (iii) in equity.*

### ARTICLE 3 CONTRACTOR

#### § 3.1 General

**§ 3.1.1** The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative. *The Term "Contractor" shall mean the respective Prime Contract person or entity identified as such in the Owner Contractor Agreement, for each respective Prime Construction Contract, as responsible for the supervisory control over allocation, coordination of all Subcontractors or trades, performance and completion of all portions of the Work, including cooperation with those doing portions of the Work under Separate Contract with the Owner.*

**§ 3.1.2** The Contractor shall perform the Work in accordance with the Contract Documents. *Prior to execution of the Agreement, the Contractor and each Subcontractor evaluated and satisfied themselves as to the conditions and limitations under which the Work is to be performed, including, without limitation, (I) the location, condition, layout, and nature of the Project site and surrounding areas, (ii) generally prevailing climatic conditions, (iii) anticipated labor supply and costs, (iv) availability and cost of materials, tools, and equipment, and (v) other similar issues. The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the Project site. Except as set forth in Section 10.3, the Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or the Contract Time in connection with any failure by the Contractor or any Subcontractor to have complied with the requirements of this Subsection 3.2.1.*

**§ 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 Article 4.2.*
- .2 All RFI's shall clearly identify the Architect's project number, the construction company's name, author's name, date issued, address, phone numbers, facsimile number and the addressee of the communication.*

§ 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. ***In addition to and not in derogation of Contractor's duties under Paragraphs 1.9.2 and 1.9.3, the Contractor shall carefully study and compare the Contract Documents with each other and shall at once report to the Architect errors, inconsistencies or omissions discovered. The Contractor shall not be liable to the Owner or Architect for damage resulting from errors, inconsistencies or omissions in the Contract Documents that could not have been discovered by a prudent and experienced contractor in advance and that are not in the nature of items described in and intended to be covered in Paragraphs 1.9.2 and 1.9., unless the Contractor recognized or reasonably should have recognized such error, inconsistency or omission and failed to report it to the Architect. If the Contractor performs any construction activity involving an error, inconsistency or omission in the Contract Documents that the Contractor recognized or reasonably should have recognized without such notice to the Architect, the Contractor shall assume complete responsibility for such performance and shall bear the full amount of the attributable costs for correction.***

§ 3.2.2.1 *If any errors, inconsistencies, or omissions in Contract Documents are recognized or reasonably should have been recognized by the Contractor, any member of its organization, or any of its Subcontractors, the Contractor shall be responsible for notifying the Architect in writing of such error, inconsistency, or omission before proceeding with the Work. The Architect will take such notice under advisement and within a reasonable time commensurate with job progress render a decision. If Contractor fails to give such notice and proceeds with such Work, it shall correct any such errors, inconsistencies, or omissions at no additional cost to the Owner.*

§ 3.2.2.2 *Conditions Precedent – Notice*

- .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 regarding such Conflict.*

- .3 If any errors, inconsistencies or omissions appear in the drawings, specifications or other Contract 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 receiving 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, Contractor and its Surety may be required to indemnify 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 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.*
- .4 Contractor acknowledges, except as to any reported error, inconsistencies or omissions, and to concealed or 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*
    - .4 all laws, ordinances, regulations, rules, and orders which bear upon the Contractor's performance of the Work.*
  - .3 The Contractor has read, understands and accepts the Contract Documents and its bid was made in accordance with them.*
  - .4 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 Architect's Addenda;*
    - .2 after commencement of the Work, under in conformance with substitution procedure elsewhere in the Contract Documents.*
  - .5 The Contract Sum is firm and all inclusive, and no escalation is contemplated for any reason 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 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.*

*.6 The Contractor shall satisfy itself as to the accuracy of all dimensions and locations. In all cases of 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.*

*Deviations from the construction documents must be noted by the Contractor at the time of shop drawing submission. Failure to do so will result in the implication of the above Sections 3.2, 3.2.1, 3.2.2, 3.2.2.1 and 3.2.2.2.*

§ 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 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, *unless the Contractor recognized such error, inconsistency, omission or difference and knowingly failed to report it to the Architect*, 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.

§ 3.2.5 *Typographical and spelling errors will be interpreted by the Architect for their intended meaning and the interpretations of the Architect shall be final and binding.*

§ 3.2.6 *Contractor, as bidder, was afforded the opportunity and encouraged to visit the project site and contractor shall be held responsible for cognizance and knowledge of existing features and conditions ascertainable by such site visit, and costs of the work associated therewith.*

### § 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.

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

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

*§ 3.3.4 The Contractor, when requested by the Architect, shall meet with representative of the Architect at all times and furnish all information requested; he shall allow the Architect to inspect the work at all times. Neither the Owner, nor the Architect shall be liable to the Contractor for extra compensation or damages for interference or delays on account of any such meetings, information, or inspections so requested or other acts of the Architect done in good faith and within the scope of their employment by the Owner. In addition, the Contractor is entrusted with the oversight, management control, and general direction of this project to ensure that all contract completion dates are met. In the event that there are any delays caused to any subcontractor on this project, liability shall lie with the Contractor and not with the Owner.*

*§ 3.3.5 The Contractor has the responsibility to ensure that all material suppliers and Subcontractors, their agents, and employees adhere to the Contract Documents, and that they order materials on time, taking into account the current market and delivery conditions and that they provide materials on time. The Contractor shall coordinate its Work with that of all others on the Project including deliveries, storage, installations, and construction utilities. The Contractor shall be responsible for the space requirements, locations, and routing of its equipment. In areas and locations where the proper and most effective space requirements, locations and routing cannot be made as indicated, the Contractor shall meet with all others involved, before installation, to plan the most effective and efficient method of overall installation.*

*§ 3.3.6 The Contractor shall establish and maintain benchmarks and all other grades, lines, and levels necessary for the Work, report errors or inconsistencies to the Architect before commencing Work and review the placement of the building(s) and permanent facilities on the site with the Owner and Architect after all lines are staked out and before foundation Work is started. Contractor shall provide access to the Work for the Owner, the Architect, other persons designated by Owner, and governmental inspectors. Any encroachments made by Contractor or its Subcontractor (of any tier) on adjacent properties due to construction as revealed by an improvement survey, except for encroachments arising from errors or omissions not reasonably discoverable by Contractor in the Contract Documents, shall be the sole responsibility of the Contractor, and Contractor shall correct such encroachments within thirty (30) days of the improvement survey (or as soon thereafter as reasonably possible), at Contractor's sole cost and expense, either by the removal of the encroachment (and*

*subsequent reconstruction on the Project site) or agreement with the adjacent property owner(s) (in form and substance satisfactory to Owner in its sole discretion) allowing the encroachments to remain.*

**§3.3.6.1** *The Contractor shall only employ or use labor in connection with the Work capable of working harmoniously with all trades, crafts, and any other individuals associated with the Project. The Contractor shall also use best efforts to minimize the likelihood of any strike, work stoppage, or other labor disturbance.*

*.1 If the Work is to be performed by trade unions, the Contractor shall make all necessary arrangements to reconcile, without delay, damage, or cost to the Owner and without recourse to the Architect or the Owner, any conflict between the Contract Documents and any agreements or regulations of any kind at any time in force among members or councils that regulate or distinguish the activities that shall not be included in the work of any particular trade.*

*.2 In case the progress of the Work is affected by any undue delay in furnishing or installing any items or materials or equipment required under the Contract Documents because of such conflict involving any such labor agreement or regulation, the Owner may require that other material or equipment of equal kind and quality be provided pursuant to a Change Order or Construction Change Directive.*

**§ 3.3.7 Coordination:**

- 1. The Lump Sum Single Prime Contractor "The Contractor" is the sole responsible party for the coordination of the entire project.*
- 2. The Contractor shall be responsible to coordinate and expedite the total construction process and all of its parts. The Owner relies upon the organization, management, skill, cooperation and efficiency of the Contractor to supervise, direct, control and manage the work and to coordinate and expedite the efforts of the other prime contractors and subcontractors so as to deliver the work conforming to the contract within the scheduled time. The Contractor is responsible for proper sequence and coordination. It shall determine the location of work and resolve conflicts amongst Contractors.*
- 3. The Contractor shall provide a qualified full-time staff member or members to manage the project. THIS PROJECT MANAGER shall coordinate, organize and manage the project from the contractor's main office and oversee the shop drawing process signing off for quality assurance and conformance with the Contract Documents on each shop drawing. The Project Manager shall be subject to the approval of the Owner and Architect who at all times have the right to require the contractor to replace this Project Manager if they fail to perform. The Project Manager shall conduct an onsite meeting at least once a week with the construction superintendent and all other prime and/or subcontractors in attendance to coordinate the project and review the schedule. The Project Manager shall provide a meeting agenda and issue minutes within four (4) working days of each meeting.*
- 4. The Contractor shall provide a qualified full-time staff member or members to manage the project on site. THIS CONSTRUCTION SUPERINTENDENT shall coordinate, organize and manage the project from the contractor's on-site field office and oversee their own work and the work of their sub-contractors. Should the prime contractor be responsible for multiple projects at different sites, or multiple locations on one large site, then the contractor shall provide a separate qualified superintendent for each of the projects or locations. This determination shall be made by and subject to the approval of the Owner and Architect who at all times may require additional manpower. The superintendent shall be responsible for onsite safety, quality assurance, conformance with the Contract Documents and perform coordination with all on site construction personnel and/or subcontractors. The Construction superintendent shall be subject to the approval of the Owner and Architect who at all times have the right to require the contractor to replace this Construction superintendent if they fail to perform.*

5. *The other subcontractors shall also have a designated superintendent and/or foreman who will at all times be subject to the approval of the Owner and Architect. The Owner and Architect reserves the right to require the contractor to replace the superintendent and/or foreman if, in the opinion of the Owner and Architect, the superintendent and/or foreman is not performing satisfactorily.*
6. *Each prime subcontractor shall coordinate his activities with the activities of other contractors.*
7. *All questions pertaining to the work are to be made to the Architect sufficiently in (via an RFI Form) advance of construction to permit comparisons investigation or references to drawings and shop drawings as necessary.*
8. *The Contractor is required to submit a site logistics plan coordinating all Owner functions with the access and safety of the job site.*
9. *The Contractor is required to coordinate all the inspection and material testing to meet the contract documents specifications.*
10. *The Contractor has full and sole responsibility for construction methods and implementation of a "quality control system" to insure coordination.*
11. *The Contractor is responsible for field verification of all dimensions/measurements for the coordination of materials and trades. Check field dimensions, clearances, relationships to available space, and anchors.*
12. *The Contractor shall make all necessary arrangements to conduct work so that all parts shall be carried on harmoniously and simultaneously or sequentially, so as components or increments of the same shall not interfere or retard the progress of others.*
13. *Minor changes in locations of equipment, parts, etc. due to field conditions shall be made, if so directed, at no additional cost.*
14. *The Contractor shall coordinate the delivery, unloading, movement, relocation, storage and protection of all materials.*
15. *The Contractor shall examine the drawings and dimensions and is responsible for satisfactory joining and fitting of all parts of the work.*
16. *Accurate dimensions, sleeved and opening drawings are to be submitted prior to placement in the field.*
17. *The Contractor shall prepare coordination drawings for all above ceiling areas throughout the entire project. Drawings showing all piping, duct, cable trays, electrical duct banks, and similar items, but not electrical conduit less than 4 inches in diameter. Complete architectural, mechanical and electrical reflected ceiling layouts, (including ductwork, conduits, piping, lighting, etc.).*
18. *The Contractor is responsible for any omissions of the subcontractors and is required to provide a complete operating facility.*
19. *The Contractor shall be responsible for preserving the integrity of ceiling heights and room sizes and shall:*
  - a. *Check compatibility with equipment, other work, electrical characteristics, and operational control requirements. Check motor voltages and control characteristics. Coordinate controls, interlocks, wiring of pneumatic switches, and relays. Coordinate wiring and control wiring diagrams. Review the effect of changes on other work. Obtain and distribute installation data on each item of equipment requiring mechanical or electrical connections;*
  - b. *Coordinate and observe start-up and demonstration of equipment and systems. Observe and maintain record of tests and inspections. Coordinate maintenance of record documents;*
  - c. *Assist the Consultant with final inspections.*
  - d. *Coordinate all mechanical, plumbing, electrical, food service and equipment/furnishings work, and coordinate that work with all other work.*
20. *Where space is limited, coordinate arrangement of mechanical, electrical, and other work to fit,*

*show plan and cross-section dimensions of space available, including structural obstructions and ceilings as applicable.*

*21. Coordinate cutting and patching activities and sequencing.*

*23. The Architect and Owner shall assist in resolution of any coordination items.*

#### **§ 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 *and the provisions of Section 01300 of the Contract Specifications.*

**§ 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.*

*.1 It is not the intent to limit the Contractor to any one material or product specified but rather to described 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.

**§ 3.4.4** *The Contractor must provide suitable storage facilities at the site for the proper protection and safe storage of his materials. Such storage facilities must be approved in advance in writing by the Architect.*

**§ 3.4.5** *All materials delivered to the premises which are to form a part of the work are to be considered the property of the Owner and must not be removed without the Architect's consent; but the Contractor shall remove all surplus materials upon completion of each phase of the work and as directed by the Architect.*

**§ 3.4.6** *When any room is used as a shop, storeroom, etc., during the progress of the work, the Contractor making use of the space will be responsible for any repairs, patching, or cleaning arising from such use. Prior approval of the Architect for use of such areas is mandatory.*

§ 3.4.7 *Not later than seven (7) days from the Notice to Proceed, the Contractor shall provide a list showing the name of the manufacturer proposed to be used for each of the products identified in the Specifications Divisions 1-16, and if applicable, the installing Subcontractor's name.*

§ 3.4.8 *The Contractor will be held to be thoroughly familiar with all conditions affecting labor in the locale of the Project, including, but not limited to, trade jurisdictions and agreements, incentive and premium time, pay, procurement, living and commuting conditions. Contractor shall assume responsibility for costs resulting from his failure to verify conditions affecting his labor.*

§ 3.4.9 *Contractor shall be responsible for labor peace on the Project and shall at all times make its best efforts and judgment as an experienced contractor to adopt and implement policies and practices designed to avoid work stoppages, slowdowns, disputes, or strikes where reasonably possible and practical under the circumstances, and shall at all times maintain Project-wide labor harmony. Except as specifically provided in Subparagraph 8.3.1, Contractor shall be liable to Owner for all damages suffered by Owner occurring as a result of work stoppages, slowdowns, disputes, or strikes.*

### § 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 shall conform to the requirements of the Contract Documents and shall 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. *This Section shall not truncate, shorten or alter in anyway, Manufacturer's warranties.*

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

§ 3.5.2.1 *The Contractor represents that all manufacturer and supplier warranties shall run directly to or be specifically assignable to the Owner. The Contractor warrants that all portions of the work that will be covered by a manufacturer's or supplier's warranty shall be performed in such a manner so as to preserve all rights under such warranties. The Contractor hereby assigns to the Owner effective upon the termination of this contract all manufacturer's and supplier's warranties relating to the Work, and the Contractor shall upon request of the Owner, execute any document reasonably requested by Owner to effectuate such assignment. If the Owner attempts to enforce a claim based upon a manufacturer's or supplier's warranty and such manufacturer or supplier refuses to honor such warranty based in whole or in part on a claim of defective installation by the Contractor, the Contractor shall be responsible for any resulting loss or damages incurred by the Owner as a result of the manufacturer's or supplier's refusal to honor such warranty. The Contractor's obligations under this Subparagraph 3.5.2 shall survive the expiration or earlier termination of the Contract. The warranty period for all work of each Contractor shall be two (2) years from the date of final inspection and acceptance by the Owner unless otherwise specified.*



### § 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.

**§ 3.6.1** *The owner is exempt from all taxes including Federal Excise Tax, fuel tax, transportation taxes and State Sales or Use Tax.*

### § 3.7 Permits, Fees, Notices and Compliance with Laws

**§ 3.7.1** ~~Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.~~ *The Contractor shall be required to secure permits or government approvals necessary for the proper execution and completion of the work. The Contractor shall obtain business licenses required by the State, County and/or City/Township and shall give all notices and comply with all laws, ordinances, rules, regulations and orders of any public authority bearing on the performance of the work.*

- .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 promptly shall notify the Architect, in writing, and necessary changes shall be accomplished by appropriate Modification.*

**3.7.1.1** *The required Building Permit or Permits shall be secured by the Contractor for the entire project.*

**§ 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. ***all costs attributable to the correction thereof or related thereto, including all fines and penalties.***

### § 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~~ ***three (3) 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 Contract Documents and that no change in the terms of the Contract

is justified, the Architect shall promptly notify the Owner and 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.

**§3.7.4.1 No adjustment in the Contract Time or Contract Sum shall be permitted in connection with a concealed or unknown condition that does not differ materially from those conditions disclosed or that reasonably should have been disclosed by the Contractor's (i) prior inspections, tests, reviews, and preconstruction services for the Project, or (ii) inspections, tests, reviews, and preconstruction services that the Contractor had the opportunity to make or should have performed in connection with the Project.**

§ 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 (See Specification "Section 01210 – Allowances")**

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

**§ 3.9 Superintendent**

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

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall 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.

*§ 3.9.4 The Construction Superintendent shall be required for the overall project and a Foreman shall be required at each project site. The number of necessary Assistants to the superintendent shall be the areas where work is in progress shall be adequately supervised by the Contractor's superintendent or one of his assistants. If, in the Architect's or Engineer's opinion, the quality or progress of the work are adversely affected by lack of adequate supervision, the Contractor shall be required to increase the number of supervisory personnel at no increase in the Contract sum.*

### § 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. *The schedule which is prepared by the Contractor shall indicate the proposed starting and completion date for the various subdivisions of the Work as well as the totality of the Work. The schedule shall be updated every thirty (30) days and must be submitted to the Architect with Contractor's Applications for Payment. If the schedule is not submitted with the payment application, no payment will be processed. Each schedule shall contain a comparison of actual progress with the estimated progress for such point in time started in the original schedule. If any schedule submitted sets forth a date for Substantial Completion for the Work or any phase of the Work beyond the Date(s) of Substantial Completion established in the Contract (as the same may be extended as provided in the Contract Documents), then Contractor shall submit to Architect and Owner for their review and approval a description of the means and methods which Contractor intends to employ to expedite the progress of the Work to ensure timely completion of the various phases of the Work as well as the totality of the Work. To ensure such timely completion, Contractor shall take all necessary action including, without limitation, increasing the number of personnel and labor on the Project and implementing overtime and double shifts. In that event, Contractor shall not be entitled to an adjustment in the Contract Sum or the schedule. Upon request and demand by Architect/Owner, Contractor shall provide a recovery schedule in accordance with the Specifications.*

§ 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 Schedules shall comply with the requirements of the Division 1 “Section 01040 - Project Coordination,” and Section 01310 - “Construction Progress Documentation.” The Schedule shall also (i) provide a graphic representation of all activities and events that will occur during performance of the Work; (ii) identify each phase of construction and occupancy; and (iii) set forth dates that are critical in ensuring the timely and orderly completion of the Work in accordance with the requirements of the Contract Documents (hereinafter referred to as “Milestone Dates”).**

**§3.10.5 In the event the Owner determines that the performance of the Work, as of a Milestone Date, has not progressed or reached the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (i) working Additional shifts or overtime, (ii) supplying Additional manpower, equipment, and facilities, and (iii) other similar measures (hereinafter referred to collectively as “Extraordinary Measures”). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule.**

**.1 The Contractor shall not be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by the Owner under or pursuant to this Subsection 3.10.5.**

**.2 The Owner may exercise the rights furnished the Owner under or pursuant to this Subsection 3.10.5 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with any Milestone Date or completion date set forth in the Contract Documents.**

**§3.10.6 The Owner shall have the right to direct a postponement or rescheduling of any date or time for the performance of any part of the Work that may interfere with the operation of the Owner's premises or any tenants or invitees thereof. The Contractor shall, upon the Owner's request, reschedule any portion of the Work affecting operation of the premises during hours when the premises are not in operation. Any postponement, rescheduling, or performance of the Work under this Subsection 3.10.6 may be grounds for an extension of the Contract Time, if permitted under Subsection 8.3.1, and an equitable adjustment in the Contract Sum if (i) the performance of the Work was properly scheduled by the Contractor in compliance with the requirements of the Contract Documents, and (ii) such rescheduling or postponement is required for the convenience of the Owner.**

### **§ 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. *See Specification “Section 01300 - Submittals,” and “Section 01700 - Project Closeout,” for specific details and requirements.*

### § 3.12 Shop Drawings, Product Data and Samples

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

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

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

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate 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. ***Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Architect without action.***

§ 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.

**§ 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.

**§ 3.12.11** *Detailed requirements are specified in Specification "Section 01300 - Submittals."*

**§3.12.12** *All shop drawings are to include manufacturer's data. All shop drawings and samples are to be submitted by the Contractor to the Architect for review. Each sheet of the shop drawings shall identify the project, contractor, subcontractor, and fabricator or manufacturer and the date of the drawings. All shop drawings shall be numbered in consecutive sequence and each sheet shall indicate the total number of sheets in the set.*

**§ 3.12.13** *Substitutions: All substitutions or deviations from plans and specification must be clearly noted as such on all shop drawings. Contractor shall identify, coordinate and pay for any additional requirements as a result of substitutions, deviations, etc., including necessary change orders. In addition, substitution submittals shall be made no later than 30 days after Notice to Proceed in order to provide time for comparison review. All submittals after 30 days shall be in strict accordance with the basis of design / specified products.*

### **§ 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.

**§ 3.13.1** *Location and weights of all equipment and materials and the Contractor intends to place on the slab shall be submitted to the Architect for review.*

**§ 3.13.2** *Only materials and equipment which are to be used directly in the Work shall be brought to and stored on the Project site by the Contractor. After equipment is no longer required for the Work, it shall be promptly removed from the Project site. Protection of construction materials and equipment stored at the Project site from weather, theft, damage and all other adversity is solely the responsibility of the Contractor.*

*§ 3.13.3 The Contractor and any entity for whom the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner with the exception of those directed to be erected through the contract documents and those necessary for site safety or in an emergency.*

*§ 3.13.4 Contractor shall ensure that the Work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the Work shall be free from all debris, building materials and equipment likely to cause hazardous conditions. Without limitation of any provision of the Contract Documents, Contractor shall use its best efforts to minimize any interference with the occupancy or beneficial use of (1) any areas and buildings adjacent to the site of the Work or (2) the Building in the event of partial occupancy, as more specifically described in Paragraph 9.9.*

*§ 3.13.5 Without prior approval of the Owner, the Contractor shall not permit any workers to use any existing facilities at the Project site, including without limitation, lavatories, toilets, entrances and parking areas other than those designated by the Owner. Without limitation of any other provision of the Contract Documents, the Contractor shall use its best efforts to comply with all rules and regulations promulgated by the Owner in connection with the use and occupancy of the Project site and the Building, as amended from time to time.*

*The Contractor shall immediately notify the Owner in writing if during the performance of the Work, the Contractor finds compliance with any portion of such rules and regulations to be impracticable, setting forth the problems of such and suggest alternatives through which the same results can be achieved. The Owner may, in the Owner's sole discretion, adopt such suggestions, develop new alternatives or require compliance with the existing requirement of the rules and regulations. The Contractor shall also comply with all insurance requirements and collective bargaining agreements applicable to use and occupancy of the Project site and the Building.*

*§ 3.13.6 The Contractor shall provide a temporary construction fence whether shown on the contract documents or not as required to separate the area or areas under construction from the Owners area or areas used by the public. The temporary fencing shall be approved by the Owner prior to installation. The fence shall be 6' high and have vinyl privacy fabric obstructing views into the construction area.*

**§ 3.14 Cutting and Patching (See Specification "Section 01045 – 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.

§ 3.15.3 *The Contractor shall perform all daily clean up and removal of debris from the site including that of his subcontractors. The Contractor shall maintain an adequate supply of laborers to accomplish daily clean up and removal of debris from the site and work areas. No debris will be allowed to accumulate in or around the building including masonry debris. The building site must be maintained free of all litter, dirt, dust and debris on a daily basis. The Owner's Team may stop all work and require all personnel on site to clean up. No accumulation of flammable material is permitted. Prior to installation of finishes the floors will be swept or vacuumed and kept free of dust and dirt until turned over to the Owner. Contractor shall immediately notify Architect/ Owner in the event of snow and or ice accumulation in the site which can reasonably affect safety.*

§ 3.15.4 *Cleaning and debris removal may be considered a safety concern by judgment of the Owner or his agents and as such the work may be stopped to provide time and labor for immediate clean up.*

§ 3.15.5 *Final Clean-Up: The Contractor has the responsibility for the final clean-up and policing of the entire site after other contractors have removed their own waste materials, rubbish, equipment, tools and plant. In addition, thereto, the Contractor shall have a professional cleaning company perform the following immediately prior to the Architect's inspection for Substantial Completion:*

- .1 Removal of all manufacturer's temporary labels from materials, equipment and fixtures.*
- .2 Removal of all stains from glass and mirrors; wash, polish, inside and outside.*
- .3 Removal of marks, stains, fingerprints, other soil, dust, dirt, from painted, decorated, or stained woodwork, plaster or plasterboard, metal, acoustic tile, and equipment surfaces.*
- .4 Remove spots, paint, soil, from resilient flooring.*
- .5 Remove temporary floor protections; clean, strip and provide three (3) coats of wax on new VCT floors or otherwise treat as directed by the material manufacturers recommendation, all finished floors. Final vacuum all carpet.*
- .6 Clean all interior finished surfaces, including doors and window frames, and hardware required to have a polished finish, of oil, stains, dust, dirt, paint, and the like; leave without fingerprints, blemishes.*
- .7 Final site clean-up shall extend beyond the Contract Limit Lines as reasonably required to insure the complete removal of all construction debris from the entire site, including staging areas.*

### § 3.16 Access to Work

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

§ 3.16.1 *The Contractor shall promptly notify the Architect/Engineer and Owner of the presence of hazardous conditions at the site, including the start of hazardous operations or the discovery or exposure of hazardous substances.*

§ 3.16.2 *Contractor shall be responsible for snow plowing and snow removal as required to maintain access/egress to construction area.*

§ 3.16.3 *Contractor shall keep only necessary equipment on site and shall cooperate with the Owner regarding location of stored material.*



**§ 3.16.4** *The Contractor is to maintain reasonable access to site for structural steel erection including crane, steel deliveries, etc. The Contractor will be responsible to coordinate requirements with the Owner a minimum of 21 days prior to deliveries.*

**§ 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**

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

**§3.18.1.1** *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, Architects, Engineers, harmless from, and against any and all claims, demands, damages, actions or causes of action by any party, 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, Architects, 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 the 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 and present), its successors, assigns, employees, agents, Architects, or Engineers, agrees to defend at the Contractor's expense any suit or proceeding brought against Owner, its individual members (past, present and future), its successors, assigns, employees, agents, Architect, Engineers due to, or arising out of the work performed by the Contractor.*

**§3.18.1.2** *The Contractor assumes the entire risk, responsibility, and liability for any and all 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, and the respective agents and employees of any of them (herein collectively called the Indemnitees) from and against any and all liability, loss, damages, interest, judgments, 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 as 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.

*§3.18.3. The Contractor must assume all risks and bear any costs and expenses occasioned by the neglect or accident during the progress of the work until same shall have been completed and accepted by the Owner. The Contractor agrees to indemnify, defend and save harmless the Owner and Architect from all suits and claims for damages, loss or injury to persons or property received or sustained from the Contractor or his agents in the performance of the work under this contract. The Contractor must properly protect all adjacent work during the progress of construction and make good all damage that may occur to any work herein specified or to adjacent property in consequence of the work herein specified. The Contractor must also assume all blame or loss by reason of neglect or violation of local or state laws, ordinances and regulation, encroachments upon neighbors, or from any other cause.*

*§3.18.4. The work in every respect shall be under the care of the Contractor and at his risk, he shall properly safeguard against any or all injury or damage to the public, to any property, materials, or thing, except where stipulated otherwise in the specifications, and also be responsible for any such damage or injury from his undertaking of this work to any person or persons or thing connected therewith. The Contractor shall indemnify and save harmless the Owner and Architect from all and all manner of, actions and causes of action, suits, judgments, damages, claims and demands whatsoever in law or equity (including the cost of defense thereof and which shall be assumed by the Contractor) in connection with this work and agreement and shall, if required, show evidence of settlement of any such action before final payment is made hereunder by the Owner.*

*§3.18.5. In the event that any such costs and expenses are claimed, made, asserted, or threatened against the Owner for which the Contractor or its insurer does not admit coverage, or if the Owner reasonably determines such coverage to be inadequate, the Owner shall have the right to withhold from any payments due or to become due to the Contractor an amount sufficient to protect the Owner from such claim, loss, cost, expense, liability, damage or injury, including attorneys' fees and expenses reasonably necessary for the defense thereof*

### §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 shall pay for all costs arising from such changes. The Contractor shall pay all Legal, Construction Management, Architectural and Engineering fees required to check the adequacy of such changes. Any changes or departures from the construction and 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 and 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;**
- .3 that such temporary and permanent work required by the Contract Documents as is to be done by him/her, 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;**
- .5 that he/she has carefully examined the plans; the specifications and the site of the work, and that from his 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;**
- .6 that he/she has determined what local ordinances, if any, will affect his work. He/She has checked for 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 local 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. *The term "Architect" means the Architect or the Architect's authorized representative.***

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

**§ 4.1.3 *If the employment of the Architect is terminated, the Owner shall employ a successor architect whose status under the Contract Documents shall be that of the Architect.***

##### **§ 4.2 Administration of the Contract**

**§ 4.2.1 *The Architect will provide administration of the Contract as described in the Contract Documents, and will be the Owner's representatives (1) during construction, (2) until final payment is due and (3) with the Owner's concurrence, from time to time during the two-year period for correction of Work described in Paragraph 12.2. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.***

§ 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. 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 *and the Architect*. The Contract Documents may specify other communication protocols.

§ 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 have 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 *13.4.1*, 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 *the Contractors* 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 *language and* 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 Owner'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.

*§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, the American Iron and Steel Institute, the American National Standards Institute, the American Society of Mechanical Engineers, the American Society of Heating, Refrigeration and Air Conditioning Engineers, the Factory Mutual System, the National Fire Protection Association, 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 opinion is superior to the material or product specified, or to limit the specification to the product 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 Sub-subcontractor.

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

~~**§ 5.2.1** Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable 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.~~

***Identification of Subcontractors required by N.J.S.A. 18A:18A-18 shall be provided with the bid specifications in accordance with that statute. The names of all subcontractors and material suppliers not covered by N.J.S.A. 18A:18A-18 shall be submitted to the Architect for approval not later than seven (7) days after the date of the notice to proceed. The list of proposed subcontractors shall include a description of the materials and equipment each proposes to furnish and install in the work. The description shall be in sufficient detail to allow the Architect to determine general conformance to Contract requirements. Approval of the submittals required under the Article shall not relieve the Contractor from conformance to the Contract Requirements***

**§ 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.

***5.2.2.1 The Architect will promptly reply in writing to the Contractor stating whether the Owner or Architect, after due investigation, has reasonable objection to any such proposal. If adequate data on any proposed manufacturer or installer is not available, the Architect may state that action will be deferred until the Contractor provides further data. Failure of the Owner or Architect to reply promptly shall not constitute a waiver of any of the requirements of the Contract Documents, and all products furnished by the listed manufacturer must conform to such requirements.***

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

~~Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.~~

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

### § 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 Sub-subcontractors.

*§ 5.3.1 The Contractor shall obligate each subcontractor specifically to comply with the New Law Against Discrimination N.J.S.A. 10:5-31 and N.J.A.C. 17:27 et seq. to avoid discriminatory practice in employment.*

*§ 5.3.2 The Contractor shall obligate each subcontractor to comply with the applicable prevailing wage schedule of the New Jersey Department of Labor and Workforce Development.*

*§ 5.3.3 The Contractor shall obligate each Sub-Contractor to comply with the Public Works Contractor Registration Act, N.J.S.A. 34:11-56.48 et seq.*

*§ 5.3.4 In the event the Contractor requires a retainage % higher than which is held by the Owner, said retainage shall not be more than 3% of the Owner's retainage.*

### § 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 and waiver of subrogation.

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

~~§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with 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.~~

***THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE ALL WORK. All trades have a mutual obligation to coordinate their work with the other trades and cooperate as necessary with the Contractor and the Construction schedule – to complete the work as required by the Owner. The Contractor is required to have their superintendent or foreman on site at all times when their work or that of their subs is in progress***

§ 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. ***Should the Contractor be damaged by any other separate Contractor on the work by reason of such***



*other Contractor's failure to perform properly his Contract with the Owner, no action will lie against the Owner and the Owner shall have no liability therefore, but the Contractor may assert his claim for damage against such separate Contractor as a third party beneficiary under the Contract between such other Contractor and the Owner.*

§ 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 *or to other completed or partially completed construction or property on the site or to property of any adjoining Owner or other party.*

*6.2.4.1 Should the Contractor cause damage to the work or property of any separate Contractor on the Project, the Contractor shall, upon due notice, settle with such other Contractor by agreement or Court of Law if he will so settle. If such separate Contractor sues the Owner, or the Architect or initiates a Court of Law proceeding on account of any damage alleged to have been so sustained, the Contractor agrees that he will hold the Owner or Architects harmless against any such suit, and that he will reimburse to the Owner or Architect, as the case may be, the cost of defending such suit, including reasonable attorney's fee and if judgment against Owner or Architect arises therefrom, the Contractor shall pay all judgment cost incurred by the Owner or Architect.*

§ 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 *as the Owner determines to be just, based on the recommendation of the Architect.*

## ARTICLE 7 CHANGES IN THE WORK

### § 7.1 General

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

*7.1.1.1 A field directive or field order shall not be recognized as having any impact upon the Contract Sum or the Contract Time and the Contractor shall have no claim therefor unless it shall, prior to complying with same and in no event no later than five (5) working days from the date such direction or order was given, submit to the Owner's Team its change proposal for the Owner's approval.*

*7.1.1.2 When submitting its change proposal, the Contractor shall include and set forth in clear and precise detail breakdowns of labor and materials for all trades involved and the estimated impact on the construction schedule including a specific number of days for a time extension. If the Change Order Request does not provide an additional time request, the Contractor shall not be entitled to an extension of time. The Contractor shall furnish spread sheets from which the breakdowns were prepared, plus spread sheets if requested of any Subcontractors.*

*The Contractor may not claim additional time at a later date and shall remove any language to that effect from his/her Change Order Request.*

§ 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 *in accordance with Paragraph 7.4.*

*§ 7.1.2.1 Neither this Contract nor the Work to be performed hereunder can be changed by oral agreement. No course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work and no claims that the Owner has been unjustly enriched by any alteration or addition to the Work, whether there is, in fact, any unjust enrichment to the Work, shall be the basis for any alleged implied agreement by the Owner to the change, any alleged waiver of the Owner's right under this Contract or any increase in any amounts due under the Contract or any or a change in any time period provided for in the Contract Documents.*

§ 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. *Except as permitted in Section 7.3 and Section 9.7, a change in the Contract Sum or the Contract Time shall be accomplished only by Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that Owner has been unjustly enriched by any alteration of or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents.*

*§ 7.1.4 A directive or order from the Owner or the Architect, other than a Change Order, a Construction Change Directive or any Order for a minor change pursuant to this Article 7, shall not be recognized as having any impact on the Contract Sum or the Contract Time and the Contractor shall have no claim therefore. If the Contractor believes that a directive or order would require it to perform work not required by the Contract Documents, the Contractor shall so inform the Owner and Architect in writing prior to complying with the same and in no event, any later than five (5) working days from the day such direction or order was given, and shall submit to the Owner and Architect for the Owner's and Architect's approval its change proposal.*

## § 7.2 Change Orders

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

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

*§ 7.2.2 Methods used in determining adjustments to the Contract Sum include those listed in Subparagraph 7.3.4. The total for overhead and profit shall NOT exceed 15%.*

*§ 7.2.3 Any change in work authorized in writing by the Owner and Architect that will require a change in the cost of the work, whether an additive or deductive change in cost, shall show a complete cost breakdown of labor, material, appropriate overhead and profit (15% maximum) and contract time.*

**§7.2.4** *When a Change Order involves both additions and deletions in material, the net quantity is to be determined and the 15% overhead and profit is to be applied to the net quantity.*

**§7.2.5** *When any change in the Work, regardless of the reason therefore, requires or is alleged to require an adjustment in Contract Time, such request for time adjustment shall be submitted by the Contractor as part of the change proposal. Any Change Order approved by the Owner and for which payment is accepted by the Contractor, in which no adjustment in Contract Time is stipulated, shall be understood to mean that no such adjustment is required by reason of the change, and any and all rights of the Contractor or any subsequent request for adjustment of Contract Time by reason of the change is waived.*

**§7.2.6** *Request by the Contractor for adjustment of the Contract Amount regardless of the reason therefore, shall be submitted to the Architect and the Owner with itemized labor and material quantities and unit prices to permit proper evaluation of the request. A submission by the Contractor containing unsubstantiated lump sum requests for adjustment of the Contract Amount will not be considered by the Owner and Architect. The Owner and Architect will not be liable for any delay incurred by reason of the Contractor's failure to submit satisfactory justification and back-up with any request for adjustment to the Contract Amount.*

**§7.2.7** *Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the initial Work which is the subject to the Change Order, including, but not limited to, all direct, indirect and impact costs associated with such change and any and all adjustment to the Contract Sum and the Construction Schedule. The Contractor will not be entitled to any compensation for additional work, impact costs or delays in the Construction Schedule not included in the Change Order.*

**§ 7.2.8** *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 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

**§ 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 *not to exceed 15%*. ~~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 *shall be in accordance with the New Jersey Prevailing Wage Rates at the time of the Contract commencement with no additional "labor burden", future increases or any other considerations.* 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, *only when machinery or equipment is not already on site* whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance *shall be limited to 1.5%*, 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 ***WILL NOT BE PERMITTED!***

***§ 7.3.4.1 The allowance for overhead and profit combined, included in the total cost to the Owner, may only include a Contractor, his Subcontractor and shall be limited to a total of 15% of the cost.***

***§7.3.4.2 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs, including labor, materials and subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are subcontractors, they shall be itemized.***

~~***§ 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.

***§ 7.3.7*** 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.

#### § 7.4 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 *within five (5) calendar days* 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.~~ *The work to be performed under this Contract shall commence after the required insurance has been obtained and approved and within three days after issuance of the notice to proceed by the Owner. The Contract Time shall commence as of the date of the Notice to Proceed unless otherwise specified 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.

*§ 8.2.4 Owner, or his/her representative, in coordination with the Contractor, shall set work hours. Contractor may be required to work nights, weekends or holidays as necessary to complete the work in accordance with the Schedule or in coordination with School Activities. Under no circumstances shall the Contractor begin or continue with work that is adversely impacting School activity or operations. All utility shutdowns, interruptions, work in or adjacent to existing buildings will be coordinated through the Owner, or his representative, and may have to be performed during hours when the School is not in operation. All cutting, hammering or other activity that is noisy, produces smoke or fumes or is otherwise disruptive to the School may have to be done during hours when the School is not in operation. Work required to be performed during non-school operating hours, as determined by the Owner or his representative, will be performed at no additional cost to the Owner.*

**§ 8.2.5 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.**

**§8.2.6 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 agrees 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 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.**

#### **§8.2.7 Adherence to Schedule**

- .1 The Owner reserves the right to withhold monthly progress payments if the Contractor is behind schedule, 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; or by occurrences beyond the control and without the fault or negligence of the Contractor and which by the exercise of reasonable diligence the Contractor is unable to prevent or provide against, including labor disputes (other than disputes limited to the work force of, or provided by, the Contractor or its Subcontractors), fire, unusual delay in deliveries not reasonably anticipatable, unavoidable casualties, or by other occurrences which the Architect, subject to the Owner's approval, determines may justify delay, then, provided that the Contractor is in compliance with Subparagraph 8.3.3 hereof, the Contract Time shall be extended by Change Order or Construction Change Directive for the length of time actually and directly caused by such occurrence as determined by the Architect and approved by the Contractor and Owner (such approval not to be unreasonably withheld, delayed, or conditioned); provided, however, that such extension of Contract Time shall be net of any delays caused by or due to the fault or negligence of the Contractor or which are otherwise the responsibility of the Contractor and shall also be net of any contingency or "float" time allowance included in the Contractor's construction schedule. The Contractor shall, in the event of any occurrence likely to cause a delay, cooperate in**

*good faith with the Architect and Owner to minimize and mitigate the impact of any such occurrence and do all things reasonable under the circumstances to achieve this goal (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 binding dispute resolution; 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.*

*§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15. Any claim for extension of time shall be made in writing to the Architect not more than five (5) days after the commencement of the delay, otherwise, it shall be waived. The Contractor shall provide an estimate of the probable effect of such delay on the progress of the work. No claim made beyond the five (5) days shall be considered valid.*

*§ 8.3.2.1 The Contractor agrees that if any delay in the Contractor's works unnecessarily delays the work of any other Contractor or Contractors, the Contractor shall in that case pay all costs and expenses incurred by such parties due to such delays and hereby authorizes the Owner to deduct the amount of such costs and expenses from any moneys due or to become due the Contractor under this Contract. The Architect shall be responsible for ascertaining whether the Contractor is responsible for delaying any of the work of any other Contractor. His decision shall be final.*

*§ 8.3.3 Notwithstanding anything to the contrary in the Contract Documents, any extension of the Contract Time, to the extent permitted under Paragraph 8.3.1., shall be the sole remedy of the Contractor for any (1) delay in the commencement, prosecution or completion of the Work, (2) hindrance or obstruction in the performance of the Work, (3) loss of productivity or (4) other similar claims (collectively referred to in this Paragraph 8.3.3. as "delays"), whether or not such delays are foreseeable, unless a delay is caused by acts of the Owner constituting active interference with the Contractor's performance of the Work and only to the extent such acts continue after the Contractor furnishes the Owner with written notice of such interference. In no event shall the Contractor be entitled to any compensation or recovery of any damages in connection with any delay including without limitation consequential damages, lost opportunity cost, impact damages or other similar remuneration. The Owner's exercise of any of its rights or remedies under the Contract Documents (including without limitation ordering changes in the Work or directing suspension, rescheduling or correction of the Work) regardless of the extent or frequency of the Owner's exercise of such rights or remedies shall not be construed as an act of interference with the Contractor's performance of the Work. This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.*

*§ 8.3.4 The Contractor agrees that the Owner can deduct from the Contract Sum, any wages paid by the Owner to any Inspector or Architect or other professional necessarily employed by the Owner for any number of days in excess of the number of days allowed in the specifications for completion of work.*

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

*§ 8.3.5 Where the cause of delay is due to weather conditions, an 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 previous sentence shall be construed according to this formula: Average rainfall (or snow or low temperature) for the past five years.*

## 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.

~~§ 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.~~

### § 9.1.3 Payment procedures shall be as follows:

1. Contractor shall submit Schedule of Values to the Architect for review
2. Prior to end of each pay period, Contractor shall submit a rough draft ("pencil copy") for their payment application for review and approval by the Architect.
3. Upon approval of pencil copy, Contractor shall submit at least four copies of their payment application to the Architect for approval along with their certified payrolls and monthly manning reports.
4. Architect will approve payments and forward to the Owner.

### § 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 *which in the aggregate equals that total Contract Sum, divided so as to facilitate payments to Subcontractors, supported by such evidence of correctness as the Architect may direct or as required by the Owner. It will be necessary for all Contractors to divide their contract into a separate schedule for the work performed at the project. These schedules, when approved by the Architect and Owner, shall be used to monitor the progress of the Work and as a basis for Certificates for Payment. All items with entered values will be transferred by the Contractor to the "Applications and Certificate for Payment," and shall include the latest approved Change Orders and Construction Change Directives. Change Order values and Construction Change Directive values shall be broken down to show the various subcontracts. The Application for Payment shall be on AIA Document G702 and G703 and the approved Voucher obtainable from the Owner. Each item shall show its total scheduled value, value of previous applications, value of the application, percentage completed, value completed and value yet to be completed. All blanks and columns must be filled in, including every percentage complete figure*. 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.

### § 9.2.2 The Contractor shall include the following separate items in his/her schedule of values:

- Punch List Work - Minimum of 1% of contract value*
- Value for testing*
- Value for Record Drawings and manuals*
- Value for final clean-up and monthly value for daily clean up by the Contractor*
- Value for equipment start-up and commissioning*
- Value for shop drawings*
- Value for Owner's attic stock*
- Safety protections*



*Project Schedule and Monthly Updates  
Winter Protection  
Allowance  
TAB coordination shiv, belts and modifications as required*

**§ 9.3 Applications for Payment**

**§ 9.3.1** *The Contractor shall submit to the Architect an itemized Application for Payment for their Contract on AIA Document G702 and G703 and the approved Voucher obtainable from the Owner. Payroll Certification for all employees of all of the workers on the project shall be submitted as well as other such data for the purposes of summarizing the work and tracking the project. The Architect will process the application and forward it with his recommendations to the Owner 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.*

**§ 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.*

**§ 9.3.1.3** *Until substantial completion, the Owner will pay 98% of the amount due the Contractor on account of progress payments until a balance of \$500,000 is due the Contractor. The retainage will then be increased to Five Percent (5%) of the \$500,000.00 balance of the contract until final completion. The retainage will be held until final acceptance of the project by the Architect and the Owner. The Contractor shall submit a separate voucher for the full amount of the retainage along with the Consent of Surety, A.I.A. Form G707A and the Contractor shall be required to furnish a Maintenance Bond for 100% of the Project Cost for a period of two (2) years from the Date of Substantial Completion.*

**§ 9.3.1.4** *Upon acceptance of the work performed pursuant to this Contract for which the Contractor has agreed to the withholding of payments pursuant to Article 9 of this Contract, all amounts being withheld by the Owner shall be paid in accordance with Paragraph 9.3.1.3 without further withholding of any amounts for any purposes whatsoever, provided that the Contract has been satisfactorily completed.*

**§ 9.3.1.5** *Each application for payment shall be accompanied by the following, all in form and substance satisfactory to the Owner and Architect:*

- 1. A current contractor's lien waiver and duly executed and acknowledged sworn statement by an officer of the Contractor showing all subcontractors and materialmen with whom the Contractor has entered into subcontracts, the amount of each such subcontract, the amount requested for any subcontractor and materialmen in the requested progress payment and the amount to be paid to the Contractor from such progress payment.*
- 2. A Purchase Order or Voucher if required by the Owner.*
- 3. A Schedule Update approved by the Architect.*
- 4. A Third Party (not the General Contractor) written Field Safety Inspection Report.*
- 5. An updated Shop Drawing Log showing the status of all of the required Shop Drawings.*

**§ 9.3.2** ~~Unless otherwise provided in the Contract Documents,~~ *At the Owner's Option*, 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 *Paragraphs 9.3.2.1, 9.3.2.2, 9.3.2.3 and 9.3.2.4* and satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

**§ 9.3.2.1** *With each Application for Payment the Contractor shall submit to the Architect and Owner a written list identifying each location where materials are stored off the Project site and the value of materials at each location. The Contractor shall procure insurance satisfactory to the Owner for materials stored off the Project site in an amount not less than the total value thereof.*

**§ 9.3.2.2** *The consent of any surety shall be obtained to the extent required prior to the payment for any materials stored off the Project site.*

**§ 9.3.2.3** *Representatives of the Owner shall have the right to make inspections of the off-site storage areas at any time.*

**§ 9.3.2.4** *Materials stored off site shall be protected from diversion, destruction, theft and damage to the satisfaction of the Owner, shall specifically be marked for use on the Project and shall be segregated from other materials at the storage facility.*

**§ 9.3.3** *The Contractor warrants and agrees that title to all Work will pass to the Owner either by incorporation in the construction or upon receipt of payment therefor by the Contractor, whichever occurs first, free and clear of all liens, claims, security interests, or encumbrances whatsoever, that the vesting of such title shall not impose any obligation on Owner or relieve Contractor of any of its obligations under the Contract, that the Contractor shall remain responsible for damages to or loss of the Work, whether completed or under construction, until responsibility for the Work has been accepted by Owner in the manner set forth in the Contract Documents, and that no Work covered by an Application for Payment will have been acquired by the Contractor, or by any other person performing Work at the site or furnishing materials and equipment for the Project, subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person.* ~~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.~~

**§ 9.3.4** *The Contractor acknowledges that actual payments pursuant to any Application for Payment and Certificate for Payment must be voted upon by the Owner at a public meeting. Typically, the Owner has monthly public business meetings. Provided an Application for Payment is received by the Architect not later than the date required by the Owner, and upon issuance of a Certificate of Payment for all or part of the Application for Payment, the Owner shall make payment to the Contractor not later than the tenth (10th) day after the Owner's regular public meeting held during the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than ten (10)*

*calendar days after the next regular public meeting of the Owner held after the late submitted Application for Payment has been reviewed and certified for payment by the Architect.*

**§ 9.3.4.1 Contractor shall comply with the terms of the agreement between Owner and Contractor with reference to Applications for Payment.**

**§ 9.3.4.2 Certification shall be subject to Consent of Surety presented by the Contractor for each application.**

#### **§ 9.4 Certificates for Payment**

**§ 9.4.1** The Architect will, within seven *Fourteen* 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 reason for withholding certification in whole as provided in Section 9.5.1. ***The Architect must receive this information in accordance with the schedule set forth at the Pre-Construction Meeting***

**§ 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**

**§ 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; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.
- .8 *The failure of any Contractors to comply with mandatory requirements for maintaining record drawings. The Contractor shall be required to check record drawings each month. Written confirmation that the record drawings are up-to-date shall be required by the Architect before approval of the Contractor's monthly payment requisition will be considered.*
- .9 *The Contractor shall provide a third-party Insurance Safety Site Inspection Report monthly and remedy all issues promptly.*
- .10 *Shop drawings not submitted as required by the Contract Documents.*
- .11 *Failure to cooperate with Owner or Architect relative to construction schedule, material storage, coordination with the Owner, clean up or safety.*

§ 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.

- .1 *If the Contractor disputes any determination by the Architect with regard to any Certificate of Payment, the 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 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.*
- .3 *Notwithstanding any provision of any law to the contrary, the Contractor agrees that the time and 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 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*
  - .2 *any deficiency or non-compliance with the Contract Documents with respect to any Work for 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.*

- .4 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 (15) fifteen days after receipt of a payment from the Owner which includes payment for the work of any such Subcontractors.**
  - .2 The Contractor shall require its Subcontractors, by appropriate agreement, to pay their subcontractors and suppliers (of any tier) within the same time.**
  - .3 The Contractor and its Surety shall indemnify and defend the Owner any loss, cost, expenses, or 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. ***Notwithstanding Certification by the Architect, the Owner may refuse to make payment based on any default by the Contractor including, but not limited to those defaults set forth in Subparagraphs 9.5.1 through 9.5.1.11. The Owner shall not be deemed in default by reason of withholding payment while any of such defaults by the Contractor remain uncured.***

**§ 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.

§ 9.6.9 *The Owner will issue timely payments to the Contractor in accordance with the requirements of "The Prompt Payment Act", N.J.S.A. 2A:30A-1, et seq. The Contractor is hereby notified that the Owner, as a public entity, requires all payments to be approved at scheduled public Board of Education 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. The time schedule will be established at the Pre-Construction Meeting and subsequent project meetings.*

### § 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 *for reasons other than a default of the Contract, including but not limited to those defaults set forth in Subparagraphs 9.5.1.1 through 9.5.1.11* pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by *a court of law* ~~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 start-up, plus interest as provided for in the Contract Documents.~~

### § 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof *which the Owner agrees to accept separately* is sufficiently complete in accordance with *this definition and* the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. *The Work will not be considered substantially complete until all project systems included in the Work are operational as designed and scheduled, all designated or required inspections, certifications, permits, approvals, licenses and other documents from any governmental authority having jurisdiction thereof necessary for the beneficial use and occupancy of the Project are received, designated instruction of Owner's personnel has been completed, and all final finishes within the Contract are in place. In general, the only remaining Work shall be minor in nature, so that the Owner can occupy the building on that date and the completion of the Work by the Contractor would not materially interfere or hamper the Owner's (or those claiming by, through or under the Owner) normal operations. Contractor recognizes that normal operations requires the use and occupancy of the Work by students and faculty without interruption and that any punchlist or corrective work shall be done at times when the Work is not so occupied. As a further condition of substantial completion acceptance, the Contractor shall certify that all remaining Work will be completed within thirty (30) consecutive calendar days or as agreed upon following the date of substantial completion. In addition to any other definitions of Substantial Completion as defined by the contract documents, the following is required before the project is considered "Substantially Complete":*

*In addition to the above the following items must be completed in order to deem the work Substantially Complete:*

- 1. All required final inspections have been completed by the authority having jurisdiction resulting in a TCO or CO.*

2. *Air Balancing Reports: Reports can be handwritten field notes but must be reviewed and approved via the shop drawing process by the Mechanical Engineer. Final Air and Water Balancing Reports certified by the licensed balancer are required for "Substantial Completion" and the start of the warranty period. (These reports must be submitted in accordance with the shop drawing process to Garrison Architects so that they can be tracked and approved and distributed to all applicable parties).*
3. *Equipment Start Up Reports: Reports can be handwritten field notes but must be reviewed and approved via the shop drawing process by the Mechanical Engineer. (These reports must be submitted in accordance with the shop drawing process to Garrison Architects so that they can be tracked and approved and distributed to all applicable parties).*
4. *Owner On-site ATC Training: Refer to the ATC specifications for training requirements on-site and off-site. The Owner does not have beneficial use of the mechanical system until they can operate it following this training.*
5. *Completion of Commissioning: Refer to the Start-up and Adjustment specifications. This process will require the Owner's Operator and the Mechanical Engineer on site to witness a demonstration and operation of every mechanical device. The devices shall be operated from the on-site Owner's ATC Computer and verified by the Mechanical Contractor's field personnel to confirm proper operation. In addition to this demonstration, the contractor shall demonstrate Owner required maintenance of all mechanical equipment to maintain the manufacturer's warranty. This should include but not be limited to belt tension/adjustments, filters, etc. Please schedule several days for the commissioning process.*
6. *Written certification from a qualified, AHC (Certified Architectural Hardware Consultant) that the hardware, cores and keying has been installed and tested in every door and is 100% complete for each phase or the total project whichever comes first.*
7. *Provide a Fire Alarm System NFPA Record of Inspection and Testing Certification Form.*

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

§ 9.8.2.1 *The Contractor shall perform a Quality Control / Quality Assurance QC/QA Punchlist of all work prior to requesting Substantial Completion and a punch list from the Owners Team. The Contractor's Project Manager shall take the lead and conduct an onsite review with the Contractor's superintendent and representation from every major sub prime contractor. Notification of this onsite walk thru shall be provided in writing to all members of the Owners Team who may or may not choose to attend. The Contractor's Project Manager shall record and distribute this QC/QA Punchlist in a matrix that provides an additional column for the Contractor to document the completion of the work and the date. After successful completion of the Contractor's QC/QA Punchlist and all work, the Contractor shall request the Owners Team perform a Punchlist. Substantial Completion shall be requested in accordance with paragraph 9.8.1.*

§ 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 *and the requirements above* 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 *in writing* 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.

**§ 9.8.4.1 *The Architect's Certificate of Substantial Completion shall be subject to the Owner's final approval.***

§ 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 *The occupancy of any portion of the Work shall not constitute acceptance of any Work, except as hereinafter stated, nor does it waive the Owner's right to Liquidated Damages. Final Acceptance of the Work shall be for the whole Work only and not part.***

**§ 9.9.5 *As portions of the Project are completed, and occupied, 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.***



## § 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. **All warranties and guarantees required pursuant to the Contract Documents shall be assembled and delivered by the Contractor to the Owner as part of the final application for payment. The final Certificate for Payment will not be issued by the Architect until all warranties and guarantees have been received and accepted by the Owner.**

**§ 9.10.1.1 The Architect's Certificate of Final Completion shall be subject to the Owner's final approval.**

§ 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) **evidence of compliance with all requirements of the Contract Documents: notices, certificates, affidavits, other requirements to complete obligations under the Contract Documents: including but not limited to (a) instruction of Owner's representatives in the operation of mechanical, electrical, plumbing and other systems, (b) delivery of keys to Owner with keying schedule: master, sub-master and special keys, (c) delivery to the Owner of Contractor's General Warranty (as described in Paragraph 3.5) and each written warranty and assignment; (d) delivery to the Owner a printed or typewritten operating, servicing, maintenance and cleaning instructions for all Work; parts lists and special tools for mechanical and electrical Work, in approval form, (e) delivery to the Owner of specified Project record documents and (f) delivery to Owner of a Final Waiver of Liens (AIA Document G-706 or other form satisfactory to Owner), covering all Work including that of all Subcontractors, vendors, labor, materials and services, executed by an authorized officer and duly notarized. In addition to the foregoing, all other submissions required by other articles and paragraphs of the Specifications including final construction schedule shall be submitted to the Architect before approval of final payment** 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.

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

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 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.

### **9.11 LIQUIDATED DAMAGES**

§ 9.11.1 *The Contractor understands and agrees that all work must be performed in an orderly and closely coordinated sequence so that the date for substantial completion is met.*

§ 9.11.2 *If the Contractor fails to complete his work or fails to complete a portion of his work, he shall pay the Owner, as liquidated damages and not as a penalty, the sum as specified in the technical portion of the contract documents. Such amount is agreed upon as a reasonable and proper measure which the Owner will sustain each calendar day by failure of the Contractor to complete work within the stipulated time.*

§ 9.11.3 *For projects that have milestone completion dates, liquidated damages shall apply to all phased construction milestone dates as established by the phasing plan, sequencing section and/or the Summary of Work.*

§ 9.11.4 *Substantial completion will be determined by the Architect as defined in paragraph 9.8.1.*

§ 9.11.5 *For damage occurring at the time of delay, the Owner may retain the amount due to him under this clause from any payments due to the Contractor.*

§ 9.11.6 *The Owner will suffer financial loss if the project is not substantially complete on the date set forth in the Contract Documents. The Contractor (and the Contractor's Surety) shall be liable for and pay to the Owner the sum of \$2,500.00 stipulated and fixed, agreed as liquidated damages for each calendar day of delay until the work is substantially complete.*

§ 9.11.7 **TWO THOUSAND FIVE HUNDRED (\$2,500) PER DAY CALENDAR DAY FOR PUNCH LIST ITEMS.** *Contractor has thirty (30) days to complete the final punch list. Liquidated damages will be addressed starting on the 31<sup>st</sup> day after receipt of Notice of Substantial Completion or issuance of the Final Punch List, whichever comes later, to that date of the Architect's acceptance that all punch list(s) have been completed.*

## **ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY**

### **§ 10.1 Safety Precautions and Programs**

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

#### **§ 10.1.1**

1. *The Contractor must fully comply with the job safety requirements in addition to all Federal, State and Local safety guidelines. All cost associated with complying with all safety requirements shall be included in each contractor's base bid.*
2. *The Contractor will serve as the overall Project Safety Coordinator and shall be responsible for all issues of safety and protection. The Contractor shall designate a safety person at the job site while the contractor is working on the project site. The designated safety person shall be responsible for the safety of their work and for their workers and to make continuous inspections for all safety issues relating to his work. The Architect is not responsible for safety on this project but will endeavor to promote safety. Each Contractor must comply with job Safety Requirements in addition to OSHA and local agency requirements. Failure to comply with safety issues will be grounds for withholding of payments.*
3. *Contractor will comply with all reasonable requests of the Owner with respect to additional security and protections required for work interfacing with Facility Operations. Safety is of utmost importance on this project and all issues relative to safety and protection of the Facility, Staff and Occupants will be treated as emergency needs and will not be subject to the 7-day notice requirements of Article 14.*
  - A. *The Contractor to provide, maintain, relocate and remove the 6' high, perimeter security fence. Fence will surround the building and proposed parking areas and will have signage attached at 100' intervals advising "Construction Area – Please Keep Out". The Contractor to be responsible for opening and securing site each day.*
  - B. *Orange safety fencing will be installed around the entire area of any and all earthwork, excavations, etc. and will be maintained until the work is complete.*
  - C. *This is a hard hat job. Identifying hard hats shall be worn at all times.*
  - D. *Hot work permits will be issued by foreman for all activities involving open flames.*
4. *The proper execution of the required safety provisions is directly related to the general condition safety line item on the schedule of values. The failure to provide a competent person on site to properly identify and take immediate corrective action may result in deductions to the general condition safety line item of the schedule of values.*
5. *The Contractor shall be responsible for the immediate investigation and resolution of all safety and environmental complaints / issues generated by contractor employees, owners, owner's representatives or members of the public.*
6. *Contractor shall maintain all egress routes throughout building. Contractor shall post exit signs as coordinated with the Owner. Contractor shall provide wall hung fire extinguishers throughout building as deemed necessary by the Owner and fire officials.*
7. *Contractor's safety representative shall perform a daily safety inspection walk through to ensure that all requirements of the OSHA Standards, Fire Protection Standards and Safe Work Practices are being with and/or corrected. The responsibility of the Contractor is to provide a safe and healthy work environment for construction personnel, Owner's personnel and representative, and the public.*
8. *Upon written receipt of safety concerns and /or issues, the Contractor shall respond in writing addressing how the safety concerns or issues were resolved. The Owner shall be copied on all safety-related correspondence.*
9. *The Contractor's response and compliance with correction of deficiencies noted in the safety concerns notice issued by the Authority having jurisdiction is mandatory. Failure to comply will be grounds for withholding of progress payments until the conditions are acceptable to O.S.H.A or Authority having local jurisdiction.*
10. *The Contractor shall submit to the Owner, a copy of all licenses (welding, power nailers, asbestos, etc.) as required by applicable agencies.*
11. *Contractor shall have all required personal protective equipment and materials available for use by each employee as required by Federal, State and Local guidelines.*

12. Contractor shall supply proper equipment and crew sizes as necessary to safely complete the work.
13. Contractor shall provide documented safety training for each of their employees and subcontractor's employees no later than the first day they arrive on site. The training shall be documented and signed by the trainer and employee. A copy of all safety-training documents is to be provided to the Owner and updated as manpower loading increases.
14. The Contractor shall supply (2) two OSHA approved means of access/egress to each floor and roof for the course of the entire project for use by all applicable parties. The Contractor shall erect and maintain OSHA approved pedestrian walking bridges, for emergency access/egress and as necessary to protect personnel from overhead work
15. The Contractor shall be responsible for providing and maintaining all temporary emergency egress routes. The Contractor shall obtain the approval of the Building and Fire Departments for all temporary emergency egress routes. General Contractor to provide for fire separation walls between occupied areas as required by local officials.
16. Contractor shall provide, relocate and /or maintain barricades, signage, provide flagmen etc. as necessary to ensure public safety and safe egress. Contractor to provide, maintain, relocate and remove in coordination with the Owner, the perimeter security fence.
17. Notify the Owner, immediately upon arrival of OSHA to the site.
18. Contractor shall submit to the Owner all MSDS sheets and shall cooperate in the posting of all required notifications relative to the use of hazardous substances on the property. Contractor to comply with NJ Law regarding the use or storage of hazardous substances in Schools. MSDS sheets shall be posted prior to product being delivered to site.
19. Contractor, subcontractor, vender, etc. should enforce a full time no smoking or alcohol use policy for all employees during the entire course of the project. Any worker found violating these reflections, or being belligerent, will be subject to removal from the site at the sole discretion of Owner.
20. Contractor shall be responsible to secure the site at the end of each workday by an effective means and maintain until all parties determine no longer required.
21. For the safety of occupants, staff, and the public, the steel erection must be scheduled and coordinated with the Owner. Swinging of steel and crane boom over occupied space will not be allowed. Steel contractor shall provide additional barricades and fencing around his crane and steel at all times.
22. Contractor must submit an acceptable OSHA compliant site specific written safety plan to the Owner for review within fourteen (14) days from the notice to proceed or prior to mobilizing on site, whichever comes first. The written safety plan shall include (as applicable to their work) but is not limited to the following:
  - Full time no smoking policy or alcohol use is allowed on the project. Any worker found violating these restrictions, or being belligerent, will be subject to removal from the site. (Contractors shall post required signs).
  - Full time hard hat policy (identifying hard hats shall be worn at all times).
  - Site specific emergency action plan with contractor phone numbers, active 24 hours a day, 7 days a week.
  - Competent on-site safety representative, named and active (Provide alternate)
  - Scaffold erection plan, including a log of daily inspections.
  - Full time fall protection plan for exposures over 6'-0".
  - Job site signage plan (Perimeter fence warning signs posted 50'-0" o/c.
  - First aid and CPR provisions.
  - OSHA 200 log and Job Safety and Health Protection poster.
  - Daily clean up.
  - Hazard Communication Program with MSDS logged and maintained.
  - Hazard Communication program.
  - Daily diary of work, issues, and incident, etc.

- *Sheeting, shoring and excavations protection line.*
- *GFI safety program.*
- *Hazardous Energy Control Lock out tag out program.*
- *Required safety clothes; Eye & ear protection, respirators, boots, belts, gloves etc. as appropriate to their work requirement.*
- *Fire Extinguishers.*
- *Removal guard rail and protection at material loading areas, 200lb force minimum requirement.*
- *All stairs and platforms must have railings, 200lb force minimum requirement. Stair pains and landings must be filled prior to their use.*
- *Daily inspection of tools and equipment; verify safety devises are operational.*
- *Ladder usage plan.*
- *Weekly toolbox meetings, documented and signed by each employee*
- *Temporary heat procedures.*

23. *Contractor shall maintain and submit a complete copy of the written safety plan, logs, diaries, plans and programs on site for the project files.*
24. *The Contractor shall provide a third-party Insurance Safety Site Inspection Report monthly and remedy all issues promptly.*

*The speed limit within the project property is 5MPH. Contractor employees operating vehicles in excess of the speed limit or in any otherwise unsafe manner will be directed to leave the site and not permitted to return.*

## § 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. *as well as any other real or personal property of the Owner.*
- .4 *The Contractor shall provide a third-party Insurance Safety Site Inspection Report monthly and remedy all issues promptly.*

§ 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.

*§ 10.2.2.1 Contractor shall comply with all regulations required by the Federal Occupational Safety and Health Act (OSHA).*

*§ 10.2.2.2 The Contractor shall conform to all applicable New Jersey Department of Environmental Protection regulations.*

*§ 10.2.2.3 Contractors must comply with construction and environmental standards contained in Federal and State Regulations and other applicable laws.*

***§ 10.2.2.4 It is the Contractor's responsibility to determine the existence of potentially hazardous materials, including lead, and to protect his workmen and the work area.***

§ 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 Construction 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.

***§ 10.2.9 The Contractor shall provide and maintain in good operating condition suitable and adequate fire protection equipment and shall comply with all reasonable recommendations regarding fire protection made by the representatives of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal. The area within the site limits under the Contractor's control shall be kept orderly and clean, and all combustible rubbish shall be promptly removed from the site. Contractor will comply with all reasonable requests of the Owner with respect to additional security and protections required for work interfacing with School Operations. Safety is of utmost importance on this project and all issues relative to safety and protection of the School, Staff and Students will be treated as emergency needs and will not be subject to the 7-day notice requirements of Article 14.***

***§ 10.2.10 The Contractor shall remove snow or ice which may accumulate on the site within areas under his control which might result in damage or delay.***

*§ 10.2.11 The Contractor shall take all precautions necessary to prevent loss or damage caused by vandalism, theft, burglary, pilferage, or unexplained disappearance of property of the Owner and Contractor, whether or not forming part of the Work, located within those areas of the Project to which the Contractor has access. Whenever unattended, including nights and weekends, mobile equipment and operable machinery shall be kept locked and made inoperable and immovable.*

*§ 10.2.12 Neither the Owner nor the Architect shall be responsible for providing a safe working place for the Contractor, the Subcontractors or their employees, or any individual responsible to them for the work.*

*§ 10.2.13 The Contractor shall conform to requirements of OSHA, the Construction Safety Code of the State Department of Labor and those of the AGC Manual. The requirements of the New Jersey and Local Building Construction Codes shall apply where there are equal to or more restrictive than the requirements of the Federal Act.*

*§ 10.2.14 When all or a portion of the Work is suspended for any reason, the Contractor shall securely fasten down all coverings and protect the Work as necessary from injury or any cause.*

*§ 10.2.15 The Contractor shall promptly report in writing to the Owner and Architect all accidents arising out of or in connection with the Work which caused death, personal injury or property damage giving full details and statements of any witnesses. In addition, if death, serious personal injury or serious property damage is caused, the accident shall be reported immediately by telephone or messenger to the Owner and Architect.*

*§ 10.2.16 Contractor is required to follow and enforce the work rules set forth below. Failure to comply with or enforce any of these rules will be grounds for suspension and/or termination of this Contract:*

- .1 No use of alcoholic beverages prior to or during working hours. Anyone found impaired after lunch will be escorted from the Project site.*
- .2 No use of illegal drugs or prescription medications which could induce drowsiness or otherwise impair perception or performance. Use of illegal drugs may result in prosecution to the fullest extent of the law. Any warning associated with use of prescription drugs must be complied with, particularly warning against operation of machinery and equipment.*
- .3 No horseplay or rough-housing will be allowed.*
- .4 No sexual, racial, or ethnic harassment, or similar conduct will be tolerated.*
- .5 All employees shall use proper sanitation habits including use of toilet facilities and garbage cans.*
- .6 All employees shall dress in clothing appropriate for the work they are to perform. All personnel are to wear hardhats, safety shoes, glasses, gloves, masks or respirators, noise protection devices, and other protective clothing and equipment as required by OSHA standards.*
- .7 All equipment is to be properly stored and/or secured at the end of the workday or if it is to remain idle for greater than one hour.*
- .8 All personnel are to be made aware of the availability of Material Safety Data Sheets for materials used at the Project site. This information is available from the Contractor using the product. The Contractor shall maintain a copy of all MSDS forms at the construction site office for all personnel to review.*

### **§ 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 *adjustments shall be accomplished as provided in Article 7.*

~~§ 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.

**§ 10.3.7 The Contractor shall submit to the Owner all MSDS sheets and shall cooperate in the posting of all required notifications relative to the use of hazardous materials on school property. Contractor to comply with NJ Law regarding the use or storage of hazardous materials in Schools.**

**§ 10.3.8 Prior to bringing any fill material (such as topsoil, engineered fill, DGA, tire scrub at the construction entrance, etc.) onto the project site, the Contractor must have the material tested and certified to be clean and free from any hazardous material. Provide this information per the submittal requirements via a shop drawing**



## § 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.

### § 10.4.1 – EMERGENCY/SAFETY PLAN

*All parties involved in the construction process should be aware of emergency services that may be required during the construction process.*

*Contractor shall establish the site-specific Emergency Action Plan and, after approval by the owner, and local authorities, shall display at site trailers and various locations at the site.*

*In case of an accident, emergency, or injury on the job site, the Contractor shall immediately follow the Site-Specific Emergency Action Plan. Following the incident, the Contractor shall submit to the owner a complete written accident report detailing the circumstances which caused the accident, extent of injuries, damage to the building, time of accident, corrective action required, etc.*

## ARTICLE 11 INSURANCE AND BONDS

### § 11.1 Contractor's Insurance and Bonds

*All insurance provisions shall be confirmed with Owner's Insurance Agent.*

§ 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 and such company shall be rated at least A- by A.M. Best. The Owner, Garrison Architects, the State of New Jersey, and the New Jersey Department of Education* shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§11.1.1.1 *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 of 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 indemnittees. 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 11, Owner may, at its option, on notice to Contractor, suspend the Contract for cause until there is full compliance with this Article 11 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, Garrison Architects, the State of New Jersey, and the New Jersey Department of Education shall be named as an additional insured on a primary and non-contributory basis on all Insurance Policies to be provided by the Contractor.*

### § 11.1.1.2 Schedule of Insurance Coverages

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User Notes:

(928403020)

- .1 Commercial General Liability, Each Occurrence**
- |    |  |                 |
|----|--|-----------------|
| a. | <i>Each Occurrence:</i>                  | \$ 1,000,000.00 |
| b. | <i>Damage to Rented Premises:</i>        | \$ 300,000.00   |
| c. | <i>Medical Expense (Any one person):</i> | \$ 15,000.00    |
| d. | <i>Personal &amp; Adv Injury:</i>        | \$ 1,000,000.00 |
| e. | <i>General Aggregate:</i>                | \$ 2,000,000.00 |
| f. | <i>Products – Comp/Op Agg:</i>           | \$ 2,000,000.00 |
- .2 Automobile Liability: (Hired autos, scheduled autos, non-owned autos)**
- |    |   |                 |
|----|---|-----------------|
| a. | <i>Combined Single Limit (each accident):</i> | \$ 1,000,000.00 |
|----|---|-----------------|
- .3 Workers Compensation and Employers Liability:**
- |    |   |                 |
|----|---|-----------------|
| a. | <i>WC Statutory Limits:</i>             |                 |
|    | 1. <i>E.L. Each Accident:</i>           | \$ 1,000,000.00 |
|    | 2. <i>E.L. Disease – Each Employee:</i> | \$ 1,000,000.00 |
|    | 3. <i>E.L. Disease – Policy Limit:</i>  | \$ 1,000,000.00 |
- .4 Builder's Risk Insurance: The Contractor shall provide Builder's Risk Insurance for all risk of physical loss or damage to the property described hereunder in an amount equal to the Total Project Value, and furnished under Construction Contracts for the School Facilities Project; excepting excavations, foundations and other structures customarily excluded by such insurance. The Policy shall name the Owner, State of New Jersey, and the New Jersey Department of Education as loss payee as their interests may appear on a primary and non-contributory basis. The Builders Risk Policy is to include coverage for the perils of Earthquake, Flood, Full Windstorm, Equipment Breakdown and Theft (excluding employee theft), contain an endorsement allowing permission to occupy and include coverage for both transit and offsite storage. The policy is also to include all contractors, subcontractors and sub-subcontractors as well as The Owner, Garrison Architects, the State of New Jersey, and the New Jersey Department of Education as Additional Named Insureds on a primary and non-contributory basis. The contractor and all subcontractors are responsible for all policy deductibles and uninsured or underinsured losses.**
- .5 The Policy shall name the following as Additional Insured:**
- The Owner, Garrison Architects, the State of New Jersey, and the New Jersey Department of Education as additional insureds on a primary and non-contributory basis*
- .6 Contractual liability insurance as applicable to the Contractor's obligations under Paragraph 3.18 of the AIA General Conditions.**
- .7 Workers' Compensation Insurance of not less than statutory limits.**
- .8 Completed Operations Insurance written to the limits specified for liability insurance specified under subparagraph .1 above. Coverage shall be required from the date of the start of Beneficial Occupancy until one year after the issuance date of Final Certificate for Payment.**

- .9 Certificates of insurance must be submitted on the ACORD Form, Certificate of Insurance. Contractor's ACORD Certificate of Insurance must state "Contractual Liability Included" or it will be rejected.**
- .10 The Contractor shall either**
- .1 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 in the preceding paragraph; or**
  - .2 insure the activities of their subcontractors under their respective policies.**

**§ 11.1.2** The Contractor shall provide surety bonds *for the entire contract amount* 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 three (3) 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.

**§ 11.1.5 Contractor shall furnish a performance bond and labor and material 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:**

- .1 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 a responsible surety licensed in the State of New Jersey Best's rating of no less than A-/X and shall remain in effect for a period of not less than two years following the date of final acceptance 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 power of attorney indicating the monetary limit of such power;**
- .5 Any bond under this Paragraph 11.1.5 must display the surety's bond number. A rider including the following provisions shall be attached to each bond:**

**(1) Surety hereby agrees that it consents to and waives notice of any addition, alteration, omission, change or other modification of the Contract Documents which singularly or in the**

*aggregate equals or is less than 20% of the Contract Sum. 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.*

*(2) 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 30 days after receipt of such notice within which to cure such default of such additional reasonable time as may be required if the nature of such default is such that it cannot be cured within 30 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.*

*§ 11.1.6 If any of the foregoing insurance coverages are required to remain in force after final payment, including, but not limited to coverage for completed operations, an additional certificate evidencing continuation of such coverage shall be submitted with the Final Application for Payment.*

*§ 11.1.7 In no event shall any failure of the Owner to receive certificates of policies required under Paragraph 11.1 or to demand receipt of such certificates prior to the Contractor commencing Work be construed as a waiver of the Owner or the Architect of the Contractor's obligations to obtain insurance pursuant to this Article 11. The obligation to procure and maintain any insurance required by this Article 11 is a separate responsibility of the Contractor and independent of the duty to furnish a certificate of such insurance policies.*

*§ 11.1.8 If the Contractor fails to purchase and maintain or require to be purchased and maintained any insurance required under this Article 11, the Owner may, but shall not be obligated to, upon 5 days written notice to the Contractor, purchase such insurance on behalf of the Contractor and shall be entitled to deduct said cost from the Contractor's Contract Sum.*

*§ 11.1.9 When any required insurance due to the attainment of a normal expiration date or renewal date shall expire the Contractor shall supply the Owner with certificates of insurance and amendatory riders or endorsements that clearly evidence the continuation of all coverage in the same manner, limits of protection and scope as was provided by the previous policy. In the event, any renewal or replacement policy for whatever reason obtained or required is written by a carrier other than that with whom the coverage was previously placed or the subsequent policy differs in any way from the previous policy, the Contractor shall also furnish replacement policy unless the Owner provides the Contractor with prior written consent to submit only a certificate of insurance for any such policy. All renewal and or replacement policies shall be in form and substance satisfactory to the Owner and written by carriers acceptable to the Owner.*

*§ 11.1.10 The Contractor shall cause each subcontractor to (1) procure insurance in the amounts set for in Article 11 and (2) name the indemnittees under Paragraph 3.18 as additional insureds under the subcontractor's comprehensive general liability policy. The additional insured endorsement included on the subcontractor's comprehensive general liability policy shall state that coverage is afforded the additional insureds with respect to claims arising out of operations performed by or on behalf of the Contractor. If the additional insureds have other insurance which is applicable to the claims, such other insurance shall be on an excess or contingent basis. The amount of the insurance liability under this insurance policy shall not be reduced by the existence of such other insurance.*

*§ 11.1.11 Property insurance provided by the Owner shall not cover any tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring, or other similar items commonly referred to as construction equipment which may be on the site and the capital value of which is not included in the work. The Contractor shall make its own*

*arrangements for any insurance it might require on such construction requirement. Any such policy obtained by the Contractor under this Paragraph 11.4.7 shall include a waiver of subrogation.*

*§ 11.1.12 The Contractor may carry whatever additional insurance he deems necessary to protect himself against hazards not covered 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, stagings, towers and forms owned or rented by the Contractor, the capital value of which is not included in the cost of the Work.*

*§ 11.1.13 All insurance coverage procured by the Contractor shall be provided by insurance companies having policy holder ratings no lower than "A-" and financial rating no lower than, "X" in the Best's Insurance guide, latest edition in effect as the date of the Contract and subsequently in effect at the time of the renewal of the policies required by the Contract Documents.*

*§ 11.1.14 If the Owner or the Contractor is damaged by the failure of the other party to purchase or maintain insurance required under Article 11, then the party who failed to purchase or maintain the insurance shall bear all reasonable costs (including attorney's fees and court and settlement costs) properly attributable thereto.*

*§ 11.1.15 The Contractors must remove all "X, C & U" exclusions from their policies.*

## **§ 11.2 Owner's Insurance**

§ 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. ***Property insurance provided by the Owner shall not cover any tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring, and other similar items commonly referred to as construction equipment that may be on the site and the capital value of which is not included in the Work. The Contractor shall make its own arrangements for any insurance it may require on such construction equipment.***

**§ 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 to the extent the loss to the Owner would have been covered by the 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 covered by 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.

#### **§ 11.3 Waivers of Subrogation**

**§ 11.3.1** The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

**§ 11.3.2** If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

#### **§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance**

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

#### **§ 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 *or Contract Sum*.

§ 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 costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

### § 12.2 Correction of Work

#### § 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 uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense. *If prior to the date of Substantial Completion, the Contractor, a subcontractor or anyone for whom either is responsible, uses or damages any portion of the Work, including without limitation, mechanical, electrical, plumbing and other building systems, machinery, equipment or other mechanical device, the Contractor shall cause each such item to be restored to "like new condition" at no expense to the Owner.*

#### § 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~~ *two (2) years* 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.

- .1 The obligations under Item 12.2 shall cover any repairs and replacement to any part of the Work or other property caused by the defective Work.*
- .2 Upon completion of any work under or pursuant to Item 12.2., the two-year correction period in connection with the work requiring correction shall be renewed and recommenced.*

§ 12.2.2.2 The ~~one-year~~ **two-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~~ **two-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 **two-year** ~~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. ***This paragraph relates exclusively to the knowing acceptance of nonconforming work by the Owner. It has no applicability to work accepted by the Owner or Architect without the knowledge that such work fails to conform to the requirements of the Contract Documents.***

***§ 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 two years of the discovery of such defects.***

- .1 This obligation shall survive the termination of any or all other obligation or obligations under the contract 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.***

## 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.~~ ***Governing law shall be the State of New Jersey and any dispute arising from the Work or this Contract shall be brought in the Superior Court of New Jersey.***

### § 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 *The Owner shall provide and contract for "structural tests and special inspections" as required by the NJ DCA Bulletin 03-5. The Contractor shall coordinate, schedule, and provide on-site supervision and man-power to facilitate the testing. All other Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor. The Architect, Owner and Contractor shall be afforded a reasonable opportunity to attend, observe, and witness all inspections and tests of the Work. The Architect or Owner may at any time request and receive from the Contractor satisfactory evidence that materials, supplies or equipment are in conformance with the Contract Documents. The Conduct of any inspection of test and the receipt of any approval shall not operate to relieve the Contractor from its obligations under the Contract Documents unless specifically so stated by Owner in writing.* 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. *The Contractor also agrees that the cost of testing services required for the convenience of the Contractor in his scheduling and performance of the Work and the cost of testing services related to remedial operations performed to correct deficiencies in the Work shall be borne by the Contractor.*

§ 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.

§ 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.

§ 13.5.1. *The Contractor shall not be entitled to any payment of interest for any reason, action or inaction by the Architect or the Owner unless required by law.*

§ 13.5.2 *Any payments withheld for time delays, faulty materials, or workmanship, shall not bear interest for period of delay or non-acceptance.*

### § 13.6 WRITTEN NOTICE

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

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

### § 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract *in the manner provided in Subparagraph 14.1.2 if repeated suspensions, delays or interruptions by the Owner as described in Paragraph 14.3 constitute in the aggregate more than 100% of the total number of days scheduled for completion or 120 days in any 365-day period, whichever is less, or if all the Work is entirely stopped for a continuous period of ~~30~~ 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:*

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not

- made payment on a Certificate for Payment (*without cause*) within the time stated in the Contract Documents; or
- ~~.4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.~~

**§ 14.1.2** *If one of the above reasons exist, the Contractor may, upon fourteen (14) days written notice to the Owner and Architect, terminate the Contract, unless this reason is cured prior to the expiration of the notice, and recover from the Owner payment of work properly executed in accordance with the Contract Documents (the basis for such payment shall be as provided in the Contract) and for payment for cost directly related to work thereafter performed by Contractor in terminating such work including reasonable demobilization and cancellation charges provided said work is authorized in advance by Architect and Owner.* The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

**§ 14.1.3** *The Owner shall not be responsible for damages for loss of anticipated profits on work not performed on account of any termination described in Subparagraph 14.1.1 and 14.1.2.*

If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

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

## **§ 14.2 Termination by the Owner for Cause**

**§ 14.2.1** The Owner may terminate the Contract if the Contractor

- .1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials *and/or equipment*;
- .2** fails to make *prompt* 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 substantial breach of a provision of the Contract Documents *disregards the instructions of Architect or Owner (when such instructions are based on the requirements of the Contract Documents)*.
- .5** *Is adjudged bankrupt or insolvent, or makes a general assignment for the benefit of Contractor's creditors, or a trustee or a receiver is appointed for Contractor or for any of its property, or files a petition to take advantage of any debtor's act, or to recognize under bankruptcy or similar laws;*
- .6** *Breaches any warranty made by the Contractor under or pursuant to the Contract Documents.*
- .7** *Fails to furnish the Owner with assurances satisfactory to the Owner evidencing the Contractor's ability to complete the Work in compliance with the requirements of the Contract Documents.*
- .8** *Fails after the commencement of the Work to proceed continuously with the construction and completion of the work for more than 10 days except as permitted under the Contract Documents.*
- .9** *Otherwise does not fully comply with 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 unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.~~

*§ 14.2.4.1 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*

#### § 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 Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

**§ 14.4.3.1 In case of such termination for the Owner's convenience, the Contractor shall be entitled to Owner 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 payments 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 paragraph. 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 compensation due to the Contractor in accord with the Contract Documents for the Work performed as of the date of termination. The warranty and indemnity obligations of the Contractor and Surety shall survive and continue, notwithstanding any termination pursuant to this paragraph, with respect to the Work performed as of the date of termination.**

**§ 14.4.4 If Owner terminates the Contract for cause pursuant to Paragraph 14.2 and it is subsequently determined that the Owner was not authorized to terminate the Contract as provided in Paragraph 14.2, the Owner's termination shall be treated as a termination for convenience under this Paragraph 14.4 and the rights and obligations of the parties shall be the same as if the Owner has issued a notice of termination to the Contractor as provided in this Paragraph 14.4.**

**§ 14.5 Contractor shall promptly pay to Owner all costs and reasonable attorney's fees incurred in connection with any action or proceeding in which Owner prevails, based on a breach of the Contract or other dispute arising out of or in connection with the Contract.**

**§ 14.6 In the event of the appointment of a trustee and/or receiver or any similar occurrence affecting the management of the account of the Contractor pertaining to the Work, it shall be the obligation of the Contractor, its representatives, receivers, sureties, or successors in interest to continue the progress of the Work without delay and specifically to make timely payment to Subcontractors and Suppliers of all amounts that are lawfully due them and to provide the Owner and all Subcontractors and Suppliers whose work may be affected with timely notice of the status of receivership, bankruptcy, etc., and the status of their individual accounts.**

**§ 14.7 Regularly scheduled job meetings shall be held at a location and time convenient to the Owner's representatives, the Architect and the Contractor. The Contractor shall attend such meetings or be represented by a person in authority who can speak for and make decisions for the Contractor.**

## ARTICLE 15 CLAIMS AND DISPUTES

### § 15.1 Claims

#### § 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, 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 *law and* requirements of *the State of New Jersey* ~~the binding dispute resolution method selected in the Agreement~~ and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

***§ 15.1.2.1 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.***

***§ 15.1.2.2 The Owner's exercise, or failure to exercise, any rights, claims or remedies it may have arising out of or relating to the Contract 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.***

***15.1.2.3 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. Further, if any provision of this Contract is deemed inconsistent with applicable law, applicable law shall control.***

***§ 15.1.2.4 Contractor shall promptly pay to Owner all costs and reasonable attorney's fees incurred in connection with any action or proceeding in which Owner prevails, based on a breach of the Contract or other dispute arising out of or in connection with the Contract.***

***§ 15.1.2.5 In the event of the appointment of a trustee and/or receiver or any similar occurrence affecting the management of the account of the Contractor pertaining to the Work, it shall be the obligation of the Contractor, its representatives, receivers, sureties, or successors in interest to continue the progress of the Work without delay and specifically to make timely payment to Subcontractors and Suppliers of all amounts that are lawfully due them and to provide the Owner and all Subcontractors and Suppliers whose work may be affected with timely notice of the status of receivership, bankruptcy, etc., and the status of their individual accounts.***

#### **§ 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 ~~24~~ 5 days after occurrence of the event giving rise to such Claim or within ~~24~~ 5 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.***

**§ 15.1.3.2 Injury or Damage to Person or Property.** *If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding five (5) days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.*

**§ 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 *final resolution of the claim.* ~~decision of the Initial Decision Maker.~~

**§ 15.1.4.3 Claims for Concealed or Unknown Conditions.** *Subject to the Contractor's obligations under Articles 1.9.2 and 2.3.4, if conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, which 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, then notice by the observing party shall be given to the other party promptly before conditions are disturbed and in no event later than five (5) days after first observance of the conditions. The Architect will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall so notify the Owner and Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made within 5 days after the Architect has given notice of the decision. If the conditions encountered are materially different, the Contract Sum and Contract Time shall be equitably adjusted, but if the Owner and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Architect for initial determination, subject to further proceedings pursuant to Section 15.2.5.1.*

#### **§ 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 herein~~ shall be given *to the Owner and Architect* before proceeding to execute the portion of the Work that is the subject of the Claim *and within five (5) days after the occurrence of the event giving rise to such Claim for increase in the Contract Sum. The foregoing written notice shall contain a written statement from the Contractor setting forth in detail the nature and cause of the Claim and an itemized statement of the increase requested. No such written notice shall form the basis of an increase to the Contract Sum unless and until such increase has been authorized by a written Change Order executed and issued according to the terms and conditions set forth herein. The Contractor hereby acknowledges that the Contractor shall not have any right to and the Owner will not consider any requests for an increase in the Contract Sum that is not submitted in compliance with the foregoing requirements.* . 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. *Said notice shall itemize all claims and shall contain sufficient detail and substantiating data to permit evaluation of same by Owner and Architect. No such claim shall be valid unless so made* 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. *Any change in the Contract Sum resulting from such claim shall be authorized only by Change Order or Construction Change Directive, as the case may be. All required notices for additional costs shall be made by Certified Mail.*

§ 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 *as determined by reference to historical data. The term "historical data" as used in the previous sentence shall be construed according to this formula: Average rainfall (or snow or low temperature) for the past five years.*

### § 15.1.7 Waiver of Claims for Consequential Damages

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

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

~~This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.~~

### § 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 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 *litigation*. ~~mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.~~

*§15.2.5.1 All claims and disputes and other matters in question between the Contractor and the Owner arising out of or relating to the Contract Documents or a breach thereof with regard to the Architect's decision, shall be decided through suit in New Jersey Superior Court venued in the County that the Owner occupies and Contractor consents to the jurisdiction of the New Jersey Superior Court venued in the County that the Owner occupies. The Contractor shall carry on all work and maintain its progress during such suit and the Owner shall continue to make payments not related to the dispute of the Contractor in accordance with Contract Documents.*

§ 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 *and Architect* 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 *and/or Architect* 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 *prior to resolution of the claim by the Architect*.



## SECTION 01010 - SUMMARY OF WORK

### 1.1 GENERAL

- A. The Project consists of a New Fieldhouse Building and Toilet Room Addition at Delsea Regional High School, 242 Fries Mill Road, Franklinville, New Jersey 08322.
- B. Owner: Delsea Regional School District, 242 Fries Mill Road, Franklinville, New Jersey 08322.
- C. Contract Documents were prepared for the Project by Garrison Architects, 713 Creek Road, Bellmawr, NJ 08031
- D. The Work consists of a New Fieldhouse Building and Toilet Room Addition including but not limited to the following, (see the construction documents for details):

#### **1. GENERAL NOTES**

- a. The Contractor shall verify all existing conditions, dimensions and areas prior to submitting a responsive / responsible bid. Site visits can be arranged through the Facilities Director Margaret Durham, Office Number (856) 694-0100 ext. 250.
- b. Prime and Subcontractors are strongly encouraged to visit the work site before submitting costs for the project. Such site visits shall be for the purpose of familiarizing the Contractors 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.
- c. Dispose of material according to state and local code and Section 01524 – Construction Waste Management.
- d. Restore all grades, lawns and pavement to pre-construction condition.
- e. Field verify existing conditions, exact dimensions of existing rooms and openings, etc. The dimensions shown on the pricing documents are approximate and provided for preliminary reference only.
- f. Record all necessary existing conditions, adjust exact materials and methods (including additional trim to cover signs of renovation) as required and submit via shop drawings for Architect's review within 45 days of receiving an executed contract.
- g. Provide selective demolition and install new equipment, finishes, and accessories as specified and in accordance with all manufacturer's recommendations and instructions.
- h. Clean finishes and wipe down partitions, glass, doors, frames, hardware and adjacent surfaces as required to remove resulting construction/renovation residue.
- i. Coordinate installation so that safe egress from the building is maintained at all times.
- j. Contractor shall locate all subsurface wires, cables, pipes and pipeline in the work area prior to construction. See General Conditions Section 2.2.3 for additional information.
- k. This work is scheduled to occur during periods of time when weather protection will be required. The Contractor is responsible for all weather related protection required to ensure that the work will continue uninterrupted until completion.

## SECTION 01010 - SUMMARY OF WORK

- l. The Contractor is responsible for all lifting and hoisting for this work. The use of the Owner's equipment will not be permitted.
- m. The Contractor is to provide a list with the names of all personnel on site, each day, and no later than two hours after the work has commenced.
- n. The adjacent existing building and school property will be occupied in all portions outside the immediate construction area for the duration of the school year. All new construction is to be performed to accommodate adjacent occupancy. Utilities must remain in service at all times except during meter and service relocations. Service relocations are to be scheduled with the respective utility companies and the Owner's Representative to minimize downtime to the greatest extent possible. Utility transfers are to be performed during off hours and weekends to minimize disruptions. The Contractor will be responsible for all resulting costs should they fail to comply with this requirement.
- o. Restore all grades, lawns, concrete curbing, sidewalks, asphalt and pavement to pre-construction condition.

### 2. SCOPE OF WORK

- a) **New Fieldhouse Building (BASE BID)** – The Project includes construction of a new 5,670 square foot building consisting of concrete footings and floor slab on grade, CMU bearing cavity walls with brick veneer, wood TJI joist and low slope EPDM membrane roof assembly at the Concession Room, wood truss & standing seam metal roof assemblies at the main roof structure & canopies, aluminum soffits at overhangs, exterior aluminum windows & door frames with FRP doors, overhead folding garage doors, interior wood doors with steel frames, accessible hardware, suspended and direct mount GWB ceilings, built-in casework equipment & stainless steel countertops, toilet room fixtures and accessories, miscellaneous interior finishes, and supporting mechanical and electrical systems. Refer to the construction drawings and specifications for a complete scope of work.
  - b) **Toilet Room Addition (ALTERNATE BID # 1)** – The Project includes construction of a new 1,158 square foot building addition at the High School consisting of concrete footings and floor slab on grade, CMU bearing cavity walls with brick veneer, steel joist framing, steel decking, low slope EPDM membrane roof assembly, metal wall panel siding, exterior aluminum frames and FRP doors, overhead folding garage door, accessible hardware, suspended GWB ceilings, toilet room fixtures and accessories, miscellaneous interior finishes, and supporting mechanical and electrical systems. Refer to the construction drawings and specifications for a complete scope of work
- E. **There are two (2) 4" HDPE pipes containing electrical lines running under the short section of the proposed Fieldhouse building. The pipes were installed via horizontal directional drilling at an approximate depth of 6 feet. The location of the pipes shall be marked out by the Contractor. The Contractor shall hand dig and locate the depth of the pipes prior to excavating the footing to verify the depth. New concrete encasement shall be provided where the electrical lines are within the footprint of the proposed building as shown on the structural drawings. The contractor assumes responsibility to not damage the pipes and any liabilities resulting from damage will be the responsibility of the Contractor including but not limited, lost revenue from the solar field.**

SECTION 01010 - SUMMARY OF WORK

- F. Schedule of work sequence:
1. No work On Site can be started until all permits are received. The existing school must be completely operational during the school year.
    - a. **All Contract Work must be completed on or before August 18, 2023.**
    - b. All construction preparation work, project startup, submittals, schedules, approvals, procurement, coordination and other preparatory tasks must commence immediately upon receipt of the Notice to Proceed or the date of the fully executed Owner/Contractor Contract, whichever comes first. The Awarded Contractor must be fully prepared to deliver and install all materials and equipment on the first day of the scheduled **On-Site Construction** period.
    - c. The **On-Site Construction** period, during which all work on site is to be performed, is to start **As Soon As Possible** following the Contract Award Date and extend to **August 18, 2023.**
- G. The Work will be constructed under one lump sum prime contract.
- H. Separate Contract: The Owner may award separate contracts for construction operations that may be conducted simultaneously with work under this Contract. Those Contracts may include the following:
1. Contract: A separate contract will be awarded for security, public address, telephone, television and computer data systems. The separate contract work only includes connections, circuits and equipment. System pathways (conduit, raceway, and wall boxes) to the control panels shall be included under this Contract's scope of work.
- I. Cooperate with the separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. If roof replacement work is being conducted simultaneously, no work can take place under the roofing operations. The Work under this contract will need to coordinate and adjust their areas of Work and the Owner's activities.
- J. Contractor Use of Premises: During construction the Contractor shall be limited to the immediate areas of Work. The Contractor shall coordinate access to the existing building directly with the Owner. **No unauthorized entry will be permitted.**
- K. Use of the Site: Limit use of premises to the areas of work. Do not disturb portions of the site beyond the areas indicated. Areas which will be disturbed shall also be fenced in during construction. All construction traffic shall be stopped during **STUDENT ARRIVAL AND DISMISSAL TIMES** for school bus operating time during every school day which is subject to change. All other times during the school day, the construction traffic will operate with extra precaution to avoid conflict with school operations and public traffic.
1. The Contractor will have full use of areas within designated "Contract Limits" for performance of the work of this contract, including storage and staging.
  2. Existing utilities must be identified by the GC for the Contractors use, subject to conditions and requirements indicated elsewhere in the Project Documents.

## SECTION 01010 - SUMMARY OF WORK

3. Access to other areas of the building will not be allowed except as required and specifically authorized in advance to complete individual items of work under this contract. Where so authorized, restrict access to the immediate area of work and only for the time it takes to complete the items of work.
    - a. When it is necessary to perform work within the occupied portion of the building, the Contractor shall first advise the Construction Manager at least 48 hours prior to the requested time so that security precautions can be made. This applies to all weekends (Saturday and Sunday).
    - b. Provide daily cleaning of facilities; restore any damage at completion of the specific item of work to the complete satisfaction of the Owner's Representative.
    - c. Remove all ladders, tools scaffolding, equipment and material at the completion of the specific item of work, at the end of each day, and which may interfere with scheduled activities.
  4. Allow for Owner occupancy and use by the public. Provide safety barriers for students, faculty and the public.
  5. Keep driveways and entrances clear. Do not use these areas for parking or material storage. Schedule deliveries to minimize on-site storage of materials and equipment.
  6. All oversized deliveries must be scheduled in coordination with the owner / construction manager. Site limitations during school hours restricts maneuvering of oversized (tractor trailer) vehicles.
  7. It is the Contractor's responsibility to provide safe, protected egress from all existing exits from the existing building as directed by the Building Official and the Fire Marshal.
  8. Contractor's personnel are not permitted to wear on-site any clothing with wording or graphics that may be construed as offensive, profane or obscene; with wording, graphics or advertising for tobacco or alcoholic products, or attire that appears provocative. The Owner, Construction Manager and/or Principal at the school will be the sole judge of what is appropriate or inappropriate.
  9. Verbal and visual comments to school staff and students will not be tolerated and will be cause for removal from the site.
  10. The use of drugs, tobacco or alcohol anywhere on the grounds or in the building will not be permitted and will be cause for removal from the site.
  11. The use of radios without earphones will not be permitted at any time
- L. Use of the Existing Building: Maintain building weather tight. Repair damage caused by construction. Protect the building and its occupants during construction.
- M. Full Owner Occupancy: The Owner will occupy the site and existing building during construction. Cooperate with the Owner to minimize conflicts and facilitate Owner usage. Do not interfere with the Owner's operations. The Owner will occupy the building throughout the construction period during the school year. The Owner will partially occupy the buildings during the summer for summer programs.
- N. Owner-Furnished Products: The Owner will furnish Toilet Accessories for the Contractor to install as noted on the drawings. Additionally, The Owner may furnish some security, telephone, television, and computer data systems. The Work includes providing support systems to receive Owner's equipment, and mechanical and electrical connections.

## SECTION 01010 - SUMMARY OF WORK

1. If items are damaged, defective, or missing, the Owner will arrange for replacement.
  2. The Contractor shall designate delivery dates in the Contractor's Construction Schedule.
  3. The Contractor shall provide support blocking and related systems as needed for proper installation as recommended by the product manufacturer.
  4. The Contractor is responsible for receiving, unloading, and handling Owner-furnished items at the site.
  5. The Contractor is responsible for protecting items from damage, including exposure to the elements. The Contractor shall repair or replace items damaged as a result of his operations.
- O. Fees, Permits and Taxes: The Contractor is advised that a Building Permit is required for this project. The plans have been submitted to the Construction Official. Upon contract award, it shall be the responsibility of the **Contractor** to secure all required permits. It shall be the **Owner's** responsibility to pay for all fees and permit costs if required. It shall be the **Contractor's** responsibility to pay for all fees and permit costs for the jobsite trailer if required.
- P. **SAFETY:** The Contractor is responsible to provide and enforce all safety onsite and conform with all OSHA regulations, codes and standards. The Owner, Construction Manager, Clerk of the Works and Architect have no responsibility to provide for the safety or protection of the trades. The Contractor shall submit a site specific Emergency Action Safety Plan and review this with all onsite personnel. The Contractor shall conduct periodic (as needed at least one a month) site safety inspections and issue a report on the conditions. The Contractor shall maintain a first aid kit onsite.
- Q. **UTILIZATION OF PERMANENT SYSTEMS:** Should the Owner elect to allow the Contractor to utilize permanent systems for temporary heat, air conditioning and ventilation activities, the Contract must provide the following as a condition precedent to utilizing the systems:
1. The Contractor's plan for utilizing the permanent systems.
  2. A list of the permanent equipment that would be utilized.
  3. Schedule for equipment start up prior to equipment utilization.
  4. Confirmation of the following:
    - a. The contractor will pay all related utility and energy use charges.
    - b. Any standby, operation or other costs would be paid by the contractor.
    - c. All equipment warranties would still begin on the project's date of substantial completion.
    - d. All duct detectors and other related life safety provisions are operational.
  5. The Contractor's plan for the installation of filters and regular servicing of the entire system during the period of the system's temporary operation.
- R. The Contractor shall not use any product containing asbestos and all plumbing materials shall be lead free. The Contractor shall provide a notarized letter stating: "No asbestos containing materials were provided on the project and the plumbing work is lead free."

SECTION 01010 - SUMMARY OF WORK

- S. The Contractor is required to purchase all long lead items within (45) days of the award of the contract. The Owner will pay for stored material in accordance with the General Conditions. Delays caused by the failure of the Contractor to adhere to this requirement will not be cause for a time extension. **NO TIME EXTENSIONS WILL BE GRANTED!**
  
- T. Contractor shall furnish a letter agreeing to provide complete parts and labor service and maintenance of all HVAC systems, equipment, devices, controls, etc., for 2 years from date of substantial completion as determined by architect. The letter shall also affirm that the Contractor will provide scheduled maintenance service quarterly (3-month interval) as the maximum time period between scheduled service.

END OF SECTION 01010



## SECTION 01040 – COORDINATION

### 1.1 GENERAL

- A. This Section includes requirements for coordinating construction operations including, but not necessarily limited to, the following:
  - 1. Coordination drawings and Specifications with all subcontractors.
  - 2. Administrative and supervisory personnel.
  - 3. Cleaning and protection is the responsibility of the Contractor.

### 1.2 COORDINATION

- A. Coordinate construction to assure efficient and orderly installation of each part of the Work. Coordinate operations that depend on each subcontractor for proper installation, connection, and operation. The Contractor shall be responsible for the following:
  - 1. Schedule operations in the sequence required to obtain the best results where installation of one part depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to assure maximum accessibility for maintenance, service, and repair.
  - 3. Make provisions to accommodate items scheduled for later installation.
  - 4. Coordination with the school for furniture and equipment which shall be relocated to new facilities.
- B. Where necessary, prepare memoranda for distribution to each party involved, outlining procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
  - 1. Prepare similar memoranda for the Owner and his contractors where coordination of their work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required procedures with other activities to avoid conflicts and assure orderly progress. Such activities include, but are not limited to, the following:
  - 1. Preparation of schedules.
  - 2. Delivery and processing of submittals.
  - 3. Progress meetings.
  - 4. Project closeout activities.
- D. Conservation: Coordinate construction to assure that operations are carried out with consideration for conservation of energy, water, and materials.
  - 1. Salvage materials and equipment involved in performance of, but not incorporated in, the Work.
- E. Coordination Drawings: Prepare coordination drawings for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space necessitates maximum utilization of space for efficient installation of different components.

## SECTION 01040 – COORDINATION

1. Show the relationship of components shown on separate shop drawings.
2. Indicate required installation sequences.
3. Comply with requirements contained in Section "Submittals."

F. Staff Names: **The Contractor shall** Within 7 days of commencement of construction, submit a list of the Contractor's staff assignments, including the superintendent and other personnel at each Project Site. Identify individuals and their responsibilities. List their addresses and telephone numbers.

1. Post copies in the Project meeting room, the temporary field office, and each temporary telephone.

### 1.3 PRODUCTS (Not Applicable)

### 1.4 EXECUTION

- A. Inspection of Conditions: Require Installers of major components to inspect substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.
- B. Coordinate temporary enclosures with inspections and tests to minimize the need to uncover completed construction.
- C. Clean and protect construction in progress and adjoining materials, during handling and installation. Apply protective covering to assure protection from damage.
- D. Clean and maintain completed construction as necessary through the construction period. Adjust and lubricate operable components to assure operability without damaging effects.
- E. Limiting Exposures: Supervise construction to assure that no part is subject to harmful, dangerous, or damaging exposure. Such exposures include, but are not limited to, the following:
1. Excessive static or dynamic loading.
  2. Excessive internal or external pressures.
  3. Excessively high or low temperatures.
  4. Water or ice.
  5. Solvents and chemicals.
  6. Abrasion.
  7. Soiling, staining, and corrosion.
  8. Combustion.
  9. Excessive dust.

END OF SECTION 01040

## SECTION 01045 - CUTTING AND PATCHING

### 1.1 GENERAL

- A. Cutting and Patching Proposal: The General Contractor shall be responsible for arranging and providing the necessary cutting and patching that is required to furnish and install all work connected with this project. The General Contractor shall submit to the Construction Manager a proposal describing procedures in advance of the time cutting and patching will be performed. Request approval from the Owner / Architect before proceeding. Include the following:
1. Describe extent of cutting and patching. Show how it will be performed and indicate why it cannot be avoided.
  2. Describe changes to existing construction. Include changes to structural elements and operating components and changes in the building's appearance and other significant visual elements.
  3. List products to be used and firms that will perform Work.
  4. Indicate dates when cutting and patching will be performed.
  5. Utilities: List utilities that will be disturbed or relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted. Arrange utility work during the Summer for minimum impact to the Schools' normal functions.
  6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
  7. Approval to proceed does not waive the Architect's right to later require complete removal and replacement of unsatisfactory work.
- B. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.
1. Obtain approval from the Construction Manager before cutting and patching the following structural elements:
    - a. Foundation construction.
    - b. Existing exterior door system
    - c. Bearing and retaining walls
    - d. Existing roof system
- C. Operational Limitations: Do not cut and patch operating elements in a manner that would reduce their capacity to perform as intended. Do not cut and patch operating elements in a manner that would increase maintenance or decrease operational life or safety.
1. Obtain written approval from the Construction Manager before cutting and patching the following operating elements or safety related systems:
    - a. Primary operational systems and equipment.
    - b. Fire protection systems.
    - c. Electrical wiring systems.
    - d. Water and sewer systems.
    - e. H.V.A.C. systems.
    - f. Cutting and patching work which affects the operation of the school must be performed after 3:00 P.M. or before 7:30 A.M. so as not to interfere with the schools' operations or as coordinated with the Construction Manager.

## SECTION 01045 - CUTTING AND PATCHING

- g. Security System.
  - h. Computer System.
  - i. Telephone and Cable TV System.
- D. Visual Requirements: Do not cut and patch exposed construction in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.
  - 1. Retain the original Installer to cut and patch the exposed Work listed below. If it is impossible to engage the original Installer, engage a recognized experienced and specialized firm.
    - a. Ornamental metal.
    - b. Casework.
    - c. Window system.
    - d. Roof system
    - e. Brick veneer work (except size as noted on the drawings).
- E. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged in such a manner as not to void warranties.

### 1.2 PRODUCTS

- A. Use materials identical to existing materials. Use materials that visually match adjacent surfaces to the fullest extent possible if identical materials are unavailable. Use materials whose performance will equal that of existing materials.

### 1.3 EXECUTION

- A. Examine surfaces to be cut and patched and conditions under which work is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action.
  - 1. Before proceeding, meet with parties involved. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect existing construction to prevent damage. Provide protection from adverse weather conditions for portions that might be exposed during cutting and patching operations.
- D. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- E. Avoid cutting pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

## SECTION 01045 - CUTTING AND PATCHING

- F. Performance: Employ skilled workmen. Proceed at the earliest feasible time and complete without delay.
1. Cut construction to install other components or perform other construction and subsequent fitting and patching required to restore surfaces to their original condition.
- G. Cutting: Cut using methods that will not damage elements retained or adjoining construction. Comply with the original Installer's recommendations.
1. Use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  2. To avoid marring finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
  3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
  4. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating and backfilling.
  5. Where services are required to be removed, relocated, or abandoned, by-pass utility services before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- H. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
1. Inspect and test patched areas to demonstrate integrity of the installation.
  2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
  3. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove floor and wall coverings and replace with new materials to achieve uniform color and appearance.
    - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire surface containing the patch after the area has received primer and second coat.
  4. Patch, repair, or rehang ceilings as necessary to provide an even-plane surface of uniform appearance.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar items. Clean piping, conduit, and similar features before applying paint or finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 01045



## SECTION 01050 - FIELD ENGINEERING

### 1.1 GENERAL

- A. This Section specifies requirements for field-engineering services including, but not limited to, the following:
  - 1. Civil-engineering services.
  - 2. Geotechnical: Conduct monitoring, testing and inspection work during construction.
  - 3. Surveying.
- B. Submit a certificate certifying location and elevation of improvements.
- C. Project Record Documents: Submit a record of Work performed and record survey data.

### 1.2 PRODUCTS (Not Applicable)

### 1.3 EXECUTION

- A. Verify layout information, in relation to property survey and existing benchmarks, before proceeding to lay out the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.
  - 1. Do not change or relocate benchmarks or control points without written approval. Report destroyed reference points or requirements to relocate reference points because of changes in grades.
  - 2. Replace destroyed Project control points. Base replacements on the original survey control points.
- B. Establish and maintain a minimum of 2 permanent benchmarks.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- C. Existing Utilities: The existence of underground utilities and construction is not guaranteed. Verify location of underground utilities and other construction before beginning sitework.
  - 1. Prior to construction, verify location and invert elevation at points of connection of sanitary and storm sewers, and water-service piping.
- D. Work from lines and levels established by the property survey. Establish benchmarks and markers to set lines and levels at each story of construction and to locate each element. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.
  - 1. Advise entities engaged in construction activities of marked lines and levels provided for their use.
  - 2. As construction proceeds, check every element for line, level, and plumb.
- E. Surveyor's Log: Maintain a surveyor's log of control and other survey work. Make this log available for reference.

SECTION 01050 - FIELD ENGINEERING

1. Record deviations from lines and levels. Advise the Architect when deviations exceed tolerances. On Project Record Drawings, record deviations that are accepted and not corrected.
  2. On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- F. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes, and invert elevations.
- G. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels, and control lines and levels required for mechanical and electrical work.
- H. Existing Utilities: Furnish information necessary to adjust, move, or relocate existing structures, utility poles, lines, services, or other appurtenances located in or affected by construction. Coordinate with local authorities having jurisdiction.

END OF SECTION 01050



## SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

### 1.1 GENERAL

- A. Definitions: Basic Contract definitions are included in the Conditions of the Contract.
- B. Indicated refers to graphic representations, notes, or schedules on the Drawings, paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. Location is not limited.
- C. Directed, requested, authorized, selected, approved, required, and permitted mean directed by the Architect, requested by the Architect, and similar phrases.
- D. Approved, when used in conjunction with the Architect's action on submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.
- E. Regulations include 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 means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. Install describes operations at the Project Site including unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. Provide means to furnish and install, complete and ready for the intended use.
- I. Installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
  - 1. The term experienced, when used with the term Installer, means having a minimum of 5 previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authorities having jurisdiction.
- J. Project Site is the space available for performing construction activities, either exclusively or in conjunction, with others performing work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
- K. Testing Agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.
- L. Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-Division format and MASTERFORMAT numbering system.

## SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

1. Abbreviated Language: Language used in Specifications is abbreviated. Implied words and meanings shall be interpreted as appropriate. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
  2. Imperative and streamlined language is used. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.
    - a. The words "shall be" are implied where a colon (:) is used within a sentence or phrase.
- M. Abbreviations and Names: Where acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

AA	Aluminum Association 900 19th St., NW, Suite 300 Washington, DC 20006 (202) 862-5156
AAMA	American Architectural Manufacturers Assoc. 1540 E. Dundee Road, Suite 310 Palatine, IL 60067 (708) 202-1350
ACI	American Concrete Institute P.O. Box 19150 Detroit, MI 48219-0150 (313) 532-2600
ACIL	American Council of Independent Laboratories 1725 K St., NW, Suite 412 Washington, DC 20006 (202) 887-5872
ADC	Air Diffusion Council One Illinois Center, Suite 200 111 East Wacker Drive Chicago, IL 60601 (312) 616-0800
AGA	American Gas Assoc. 1515 Wilson Blvd. Arlington, VA 22209 (703) 841-8400

## SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

AIA	American Institute of Architects 1735 New York Ave., NW Washington, DC 20006 (202) 626-7300
A.I.A.	American Insurance Assoc. 1130 Connecticut Ave., NW, Suite 1000 Washington, DC 20036 (202) 828-7100
AISC	American Institute of Steel Construction One East Wacker Drive, Suite 3100 Chicago, IL 60601-2001 (312) 670-2400
AISI	American Iron and Steel Institute 1101 17th Street, NW, Suite 1300 Washington, DC 20036 (202) 452-7100
AMCA	Air Movement and Control Assoc. 30 W. University Drive Arlington Heights, IL 60004 (708) 394-0150
ANSI	American National Standards Institute 11 West 42nd Street, 13th Floor New York, NY 10036 (212) 642-3300
APA	American Plywood Assoc. P.O. Box 11700 Tacoma, WA 98411 (206) 565-6600
ARI	Air Conditioning and Refrigeration Institute 1501 Wilson Blvd., 6th Floor Arlington, VA 22209 (703) 524-8800
ASC	Adhesive and Sealant Council 1627 K Street, NW, Suite 1000 Washington, DC 20006 (202) 452-1500
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329 (404) 636-8400

## SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

ASME	American Society of Mechanical Engineers 345 East 47th St. New York, NY 10017 (212) 705-7722
ASPE	American Society of Plumbing Engineers 3617 Thousand Oaks Blvd., Suite 210 Westlake, CA 91362 (805) 495-7120
ASSE	American Society of Sanitary Engineering P.O. Box 40362 Bay Village, OH 44140 (216) 835-3040
ASTM	American Society for Testing and Materials 1916 Race St. Philadelphia, PA 19103 (215) 299-5400
AWI	Architectural Woodwork Institute P.O. Box 1550 13924 Braddock Rd., Suite 100 Centreville, VA 22020 (703) 222-1100
AWPA	American Wood Preservers' Assoc. P.O. Box 849 Stevensville, MD 21666 (301) 643-4163
AWPB	American Wood Preservers Bureau P.O. Box 5283 Springfield, VA 22150 (703) 339-6660
AWS	American Welding Society 550 LeJeune Road, NW P.O. Box 351040 Miami, FL 33135 (305) 443-9353
AWWA	American Water Works Assoc. 6666 W. Quincy Ave. Denver, CO 80235 (303) 794-7711
BHMA	Builders' Hardware Manufacturers Assoc. 355 Lexington Ave., 17th Floor New York, NY 10017 (212) 661-4261

## SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

BIA	Brick Institute of America 11490 Commerce Park Drive, Suite 300 Reston, VA 22091 (703) 620-0010
BOCA	Building Officials and Code Administrators International 4051 West Flossmoor Road Country Club Hills, IL 60478 (708) 799-2300
CDA	Copper Development Assoc. Box 1840, Greenwich Office Park 2 Greenwich, CT 06836 (203) 625-8210
CFR	Code of Federal Regulations Available from Government Printing Office; Washington, DC 20402 (usually first published in Federal Register)
CISPI	Cast Iron Soil Pipe Institute 5959 Shallowford Road, Suite 419 Chattanooga, TN 37421 (615) 892-0137
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Rd. Schaumburg, IL 60173-4758 (708) 517-1200
CS	Commercial Standard of NBS (U.S. Department of Commerce) Governmental Printing Office; Washington, DC 20402
DHI	Door and Hardware Institute 14170 New Brook Drive Chantilly, VA 22021-2223 (703) 222-2010
EIA	Electronic Industries Assoc. 2001 Pennsylvania Ave., NW, Suite 1100 Washington, DC 20006 (202) 457-4900
FCC	Federal Communications Commission 1919 M Street, NW Washington DC 20006 (202) 632-7000
FCI	Fluid Controls Institute P.O. Box 9036 Morristown, NJ 07960 (201) 829-0990

## SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

FGMA	Flat Glass Marketing Assoc. White Lakes Professional Bldg. 3310 S.W. Harrison Topeka, KS 66611-2279 (913) 266-7013
FM	Factory Mutual Research Organization 1151 Boston-Providence Turnpike P.O. Box 9102 Norwood, MA 02062 (617) 762-4300
FS	Federal Specification (General Services Admin.) Obtain from your Regional GSA Office, or purchase from GSA Specification Unit (WFSIS); 7th and D Streets, SW, Washington, SC 20406 (202) 472-2205 or 2140
FTI	Facing Tile Institute P.O. Box 8880 Canton, OH 44711 (216) 488-1211
GA	Gypsum Association 810 First Street, NE, Suite 510 Washington, DC 20002 (202) 289-5440
HPMA	Hardwood Plywood Manufacturers Assoc. 1825 Michael Farraday Drive P.O. Box 2789 Reston, VA 22090-2789 (703) 435-2900
ICC	International Code Council, Inc. 5203 Leesburg Pike, Suite 708 Falls Church, VA 22041 (703) 931-4533
IEEE	Institute of Electrical and Electronic Engineers 345 E. 47th St. New York, NY 10017 (212) 705-7900
IESNA	Illuminating Engineering Society of North America 345 E. 47th St. New York, NY 10017 (212) 705-7926

SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

ILI	Indiana Limestone Institute of America Stone City Bank Building, Suite 400 Bedford, IN 47421 (812) 275-4426
IRI	Industrial Risk Insurers 85 Woodland St. Hartford, CT 06102 (203) 520-7300
ISA	Instrument Society of America P.O. Box 12277 67 Alexander Drive Research Triangle Park, NC 27709 (919) 549-8411
MCAA	Mechanical Contractors Association of America 1385 Piccard Dr. Rockville, MD 20832 (301) 869-5800
MIA	Marble Institute of America 33505 State St. Farmington, MI 48024 (313) 476-5558
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park St., NE Vienna, VA 22180 (703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers 200 S. Federal St., Suite 400 Chicago, IL 60605 (312) 922-6222
NAPF	National Association of Plastic Fabricators (Now DLPA)
NBGQA	National Building Granite Quarries Assoc. c/o Rock of Ages Corp. P.O. Box 482 Barre, VT 05641 (802) 476-3115
NBS	National Bureau of Standards (U.S. Dept. of Commerce) Gaithersburg, MD 20234 (301) 921-1000

## SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

NCMA	National Concrete Masonry Assoc. 2302 Horse Pen Road Herndon, VA 22071 (703) 713-1900
NEC	National Electric Code (from NFPA)
NECA	National Electrical Contractors Assoc. 7315 Wisconsin Ave., Suite 1300 W Bethesda, MD 20814 (301) 657-3110
NEII	National Elevator Industry, Inc. 185 Bridge Plaza, North Fort Lee, NJ 07024 (201) 944-3211
NEMA	National Electrical Manufacturers Assoc. 101 L St., NW, Suite 300 Washington, DC 20037 (202) 457-8400
NFPA	National Fire Protection Assoc. One Batterymarch Park P.O. Box 9101 Quincy, MA 02269-9101 (617) 770-3000
N.F.P.A.	National Forest Products Assoc. 1250 Connecticut Ave., NW, Suite 200 Washington, DC 20036 (202) 463-2700
NHLA	National Hardwood Lumber Assoc. P.O. Box 34518 Memphis, TN 38184-1818 (901) 377-1818
NPA	National Particleboard Assoc. 18928 Premiere Court Gaithersburg, MD 20879 (301) 670-0604
NRCA	National Roofing Contractors Assoc. One O'Hare International Center 10255 W. Higgins Rd., Suite 600 Rosemont, IL 60018-5607 (708) 299-9070



SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

NSF	National Sanitation Foundation 3475 Plymouth Rd. P.O. Box 130140 Ann Arbor, MI 48105 (313) 769-8010
NTMA	National Terrazzo and Mosaic Assoc. 3166 Des Plaines Ave., Suite 132 Des Plaines, IL 60018 (708) 635-7744
NWMA	National Woodwork Manufacturers Assoc. (Now NWWDA)
NWWDA	National Wood Window and Door Assoc. 1400 E. Touhy Ave., #G54 Des Plaines, IL 60018 (708) 299-5200 (800) 223-2301
OSHA	Occupational Safety Health Administration (U.S. Dept. of Labor) Government Printing Office; Washington, DC 20402
PDI	Plumbing and Drainage Institute c/o Sol Baker 1106 W. 77th St., South Dr. Indianapolis, IN 46260-3318 (317) 251-6970
PS	Product Standard of NBS (U.S. Department of Commerce) Government Printing Office; Washington, DC 20402
RFCI	Resilient Floor Covering Institute 966 Hungerford Drive, Suite 12-B Rockville, MD 20805 (301) 340-8580
SDI	Steel Deck Institute P.O. Box 9506 Canton, OH 44711-9506 (216) 493-7886
S.D.I.	Steel Door Institute c/o A. P. Wherry & Assoc. 30200 Detroit Road Cleveland, OH 44145 (216) 889-0010

SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

SHLMA Southern Hardwood Lumber Manufacturers Assoc.  
(Now HMA)

SIGMA Sealed Insulating Glass Manufacturers Assoc.  
401 N. Michigan  
Chicago, IL 60611-4206  
(312) 644-6610

SJI Steel Joist Institute  
1205 48th Avenue North, Suite A  
Myrtle Beach, SC 29577  
(803) 449-0487

SMACNA Sheet Metal and Air Conditioning  
Contractors National Association  
P.O. 221230  
Chantilly, VA 22022-1230  
(703) 803-2980

SSPC Steel Structures Painting Council  
4400 Fifth Ave.  
Pittsburgh, PA 15213-2683  
(412) 268-3327

TCA Tile Council of America  
P.O. Box 326  
Princeton, NJ 08542  
(609) 921-7050

TIMA Thermal Insulation Manufacturers Assoc.  
29 Bank Street  
Stamford, CT 06901  
(203) 324-7533  
(Standards now issued by NAIMA)

UL Underwriters Laboratories, Inc.  
333 Pfingsten Rd.  
Northbrook, IL 60062  
(708) 272-8800

- N. Permits, Licenses, and Certificates: For the 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 in conjunction with compliance with standards and regulations bearing upon performance of the Work.

2.1 PRODUCTS (Not Applicable)

3.1 EXECUTION (Not Applicable)

END OF SECTION 01095

## SECTION 01200 - PROJECT MEETINGS

### 1.1 GENERAL

- A. It is the responsibility of the Construction Manager (CM) to set up, run and record the minutes for the meetings.
- B. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:
  - 1. Preconstruction conferences.
  - 2. Preinstallation conferences.
  - 3. Progress meetings.
- C. Preconstruction Conference: A preconstruction conference shall be scheduled before starting any construction to review responsibilities and personnel assignments.
  - 1. Attendees: Authorized representatives of the Owner, CM, Architect, and their consultants; the Contractor and his superintendent; major subcontractors; and other concerned parties shall attend.
    - a. Participants shall be familiar with the Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Discuss items that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Critical work sequencing.
    - c. Submittal of Shop Drawings, Product Data, and Samples.
    - d. Use of the premises.
    - e. Product delivery dates.
    - f. Job site safety.
- D. Preinstallation Conferences: The CM shall conduct a conference before each activity that requires coordination with other operations.
  - 1. Attendees: The Installer, CM, the Contractor, the Subcontractors related to the work, and representatives of manufacturers and fabricators involved in or affected by the installation shall attend.
    - a. Review the progress of other operations and preparations for the activity under consideration at each preinstallation conference, including requirements for the following:
      - 1) Compatibility problems and acceptability of substrates.
      - 2) Time schedules and deliveries.
      - 3) Manufacturer's recommendations.
      - 4) Warranty requirements.
      - 5) Inspecting and testing requirements.
    - b. The CM shall record significant discussions and agreements and disagreements, and the approved schedule. Promptly distribute the record of the meeting to everyone concerned, including the Owner and the Architect.

## SECTION 01200 - PROJECT MEETINGS

- c. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate actions necessary to resolve problems and reconvene the conference.
- E. Progress Meetings: The CM shall conduct progress meetings at the construction site every two weeks. The Contractor will notify the GC, Owner, the Architect and all subcontractors of scheduled dates. Coordinate meeting dates with preparation of the payment request. It is the Owner/CM /Architect's option to require weekly job site coordination meetings at each job site in addition to the bi-weekly progress meeting.
1. Attendees: The Owner, CM, Architect, Contractor, and other entities concerned with current progress or involved in planning, coordination, or future activities shall be represented. Participants shall be authorized to conclude matters relating to the Work.
- F. Agenda: Review and correct or approve minutes of the previous meeting. Review items of significance that could affect progress. Include topics for discussion appropriate to Project status.
1. Contractor's Construction Schedule: The Contractor shall review the progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule. Determine how to expedite construction behind schedule; secure commitments from parties involved to do so. Discuss revisions required to insure subsequent activities will be completed within the Contract Time.
  2. Review the present and future needs of each entity present, including the following:
    - a. Time.
    - b. Sequences.
    - c. Status of submittals.
    - d. Deliveries and off-site fabrication problems.
    - e. Temporary facilities and services.
    - f. Quality and work standards.
    - g. Change Orders.
    - h. Coordinate with school schedule and programs.
  3. Reporting: Distribute meeting minutes to each party present and to parties who should have been present. Include a summary of progress since the previous meeting and report.
  4. Schedule Updating: Revise the Contractor's Construction Schedule after each meeting where revisions have been made. Issue the revised schedule concurrently with the report of each meeting.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

END OF SECTION 01200

## SECTION 01210 - ALLOWANCES

### 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. Section includes administrative and procedural requirements governing allowances.
  - 1. A Lump Sum Amount is specified in this Section of the Contract Documents. This amount shall be included as a separate line item in the Schedule of Values for the Project.
- B. Related Sections:
  - 1. Division 1 Section "Unit Prices" for procedures for using unit prices.
  - 2. A201 General Conditions of the Contract for procedures for submitting and handling Change Orders.
  - 3. Divisions 2 through 16 Sections for items of Work covered by allowances.

#### 1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, the contractor shall advise the Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At the Architect's request, the contractor shall provide a Change Order proposal for additional work to be deducted from the allowance. Include recommendations that are relevant to performing the Work. The Change Order Proposal shall include all material and labor with sufficient breakdown for review.
- C. Purchase products and systems selected by Architect from the designated supplier, "or equal" substitutions are not applicable.

#### 1.4 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in the Cash Allowance, in the form specified for Change Order Requests.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

## SECTION 01210 - ALLOWANCES

- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

### 1.5 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

### 1.6 CASH ALLOWANCES (Overhead and profit are permitted totaling a maximum of 15% per the AIA Contract. Supervision, bond and insurance are not permitted)

- A. Cash Allowance shall be used only as directed and approved by the Architect for the Owner's purposes.
- B. The Change Order Request format shall be used to request authorization for use of funds from the Cash Allowance. The Contractor's overhead and profit margins are fixed to a maximum of 15% per the AIA Contract. The contractor is not permitted to charge for additional supervision, bond and insurance as these costs are included in the Base Contract Sum.
- C. At Project closeout, the contractor shall provide a full credit for unused amounts remaining in the Cash Allowance to the Owner by Change Order.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

### 3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

### 3.3 SCHEDULE OF ALLOWANCES

- A. \$50,000.00 cash allowance.

END OF SECTION 01210

## SECTION 01300 – SUBMITTALS

### 1.1 GENERAL

- A. The Contractor shall use the enclosed Cover Page form for **every copy** of every shop drawings submitted with the exception of full size drawings that have a title block for custom or project specific materials or systems. The Contractor's Cover Page form shall be signed by the Project Manager with an original signature indicating that the information has been reviewed and coordinate.
- B. Submittal Procedures: Coordinate submittal and preparation with construction, fabrication, other submittals, and activities that require sequential operations with all Sub-Contractors. Transmit in advance of construction operations to avoid delay.
1. Coordinate submittals for related operations to avoid delay because of the need to review submittals concurrently for coordination. The Architect reserves the right to withhold action on a submittal requiring coordination until related submittals are received.
  2. Processing: Allow 2 weeks for initial review. Allow more time if the Architect must delay processing to permit coordination with other trades or Owner's contractors. Allow 2 weeks for reprocessing.
    - a. No extension of Contract Time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.
    - b. **All Shop Drawings, product data and samples shall be submitted within forty-five (45) days of Notice of Award. No Payments will be approved if the Shop Drawings process is not completed within this time schedule.**
    - c. **Substitution submittals shall be made no later than 30 days after Notice to Proceed in order to provide time for comparison review. All submittals after 30 days shall be in strict accordance with the basis of design / specified products. No Substitutions will be considered after 30 days.**
- C. Contractor's Construction Schedule: Prepare a horizontal bar-chart-type, contractor's construction schedule. Provide a separate time bar for each activity and a vertical line to identify the first working day of each week. Use the same breakdown of Work indicated in the "Schedule of Values." Indicate estimated completion in 10 percent increments. As Work progresses, mark each bar to indicate actual completion.
1. Submit within 14 days of the date established for "Commencement of the Work."
  2. Prepare the schedule on stable transparency, or other reproducible media, of width to show data for the entire construction period.
  3. Secure performance commitments from parties involved. Coordinate each element with other activities; include minor elements involved in the Work. Show each activity in proper sequence. Indicate sequences necessary for completion of related Work.
  4. Coordinate with the Schedule of Values, list of subcontracts, Submittal Schedule, payment requests, and other schedules.

## SECTION 01300 – SUBMITTALS

5. Indicate completion in advance of Substantial Completion. Indicate Substantial Completion to allow time for the Architect's procedures necessary for certification of Substantial Completion.
  6. Phasing: Show how phased completion affects the Work.
  7. Work Stages: Indicate important stages for each portion of the Work.
  
  8. Area Separations: Provide a separate time bar to identify each construction area for each portion of the Work. Indicate where each element must be sequenced with other activities.
- D. The Contractor shall receive the schedule from each Sub-Contractor. The Contractor shall coordinate with all Sub-Contractors and prepare an overall construction schedule in five (5) days to submit to the Owner / Architect for approval.
- E. Submittal Schedule: After developing the Contractor's Construction Schedule, prepare a schedule of submittals. Submit the Submittal Schedule to indicate compliance with Item A, Paragraph 2b, on page one of this section.
1. Coordinate with list of subcontracts, Schedule of Values, list of products, and the Contractor's Construction Schedule.
  2. Prepare the schedule in chronological order. Provide the following information:
    - a. Date for first submittal.
    - b. Related details on drawings.
    - c. Related Section number in the Specifications.
    - d. Submittal category (Shop Drawings, Product Data, or Samples).
    - e. Name of the subcontractor.
    - f. Description of the Work covered.
    - g. Date for the Architect's final approval.
  3. Schedule Distribution: Distribute copies of the Contractor's Construction Schedule and the Submittal Schedule to the Architect, Owner, subcontractors, and parties required to comply with submittal dates. Post copies in the field office.
    - a. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their Work and are no longer involved in construction activities.
    - b. Updating: Revise the schedule after each meeting or activity where revisions have been made. Issue the updated schedule concurrently with the report of each meeting.
- F. Daily Construction Reports: The Contractor shall prepare a daily report recording events at the site and submit copies to the Owner, Construction (if applicable) and Architect on a monthly basis or upon request. Include the following information:
1. List of subcontractors at the site.
  2. High and low temperatures, general weather conditions.



## SECTION 01300 – SUBMITTALS

3. Accidents and unusual events.
  4. Stoppages, delays, shortages, and losses.
  5. Meter readings and similar recordings.
  6. Emergency procedures.
  7. Orders and requests of governing authorities.
  8. Services connected, disconnected.
  9. Equipment or system tests and startups.
  10. Substantial Completions authorized.
  11. A list of all visitors indicating the nature of their visit, the company they represent and the person with whom they spoke.
- G.** Color Selection Schedule: The Contractor shall submit a color selection schedule providing a listing of every product that requires color selections and categorized by exterior colors, interior colors and by room. The Contractor is responsible to coordinate meeting times with the Owner and Construction Manager (if applicable) to select colors so as not to affect the overall construction schedule or material procurement. All color samples shall be delivered to the job site trailer. **Do not submit color samples with shop drawings to the Architect.** Provide actual material color samples. **Reproduced paper or web-based email color charts are not acceptable.**
- H.** Shop Drawings: The Contractor shall submit newly prepared information drawn to scale. Indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information. The Contractor shall email electronic Shop Drawings to [shopdrawings@garrisonarch.com](mailto:shopdrawings@garrisonarch.com) Each separate Shop Drawing shall be submitted in a separate email as one PDF file with the “Shop Drawing Cover Page” completely filled out as the first page. The Shop Drawings shall be numbered sequentially. Include the following information:
1. Dimensions.
  2. Identification of products and materials included by sheet and detail number.
  3. Compliance with standards.
  4. Notation of coordination requirements.
  5. Notation of dimensions established by field measurement.
  6. Sheet Size: At least 8-1/2 by 11 inches **but no larger than 30 by 42 inches.** The Contractor shall then copy if required and forward the reviewed prints to all of the Sub-Contractors.
    - a. Do not use Shop Drawings without an appropriate final stamp indicating action taken.
  7. The Contractor shall be responsible to provide the Owner and Construction Manager (if applicable) with a completed printed set of all final Shop Drawings. Promptly provide each shop drawing paper copy as approved. Do not hold or delay the paper copy from the field.
- I.** Product Data: Collect Product Data into a single submittal for each element of construction. Mark each copy to show applicable choices and options. Where Product Data includes information on several products, mark copies to indicate applicable information.
1. Include the following information:

## SECTION 01300 – SUBMITTALS

- a. Manufacturer's printed recommendations.
  - b. Compliance with trade association standards.
  - c. Compliance with recognized testing agency standards.
  - d. Application of testing agency labels and seals.
  - e. Notation of dimensions verified by field measurement.
  - f. Notation of coordination requirements.
2. Preliminary Submittal: Submit a preliminary single copy of Product Data where selection of options is required.
  3. Submittals: Submit a PDF via email to shopdrawings@garrisonarch.com with the completed "Shop Drawing Cover Page" as the first page of the PDF. The Architect will return the PDF via email marked with action taken. Please note that the Contractor shall be required to submit a paper copy of all finalized Shop Drawings to the Owner and Construction Manager (if applicable).
    - a. Unless noncompliance with Contract Documents is observed, the submittal serves as the final submittal.
  4. Distribution: Furnish copies to installers, subcontractors, suppliers, and others required for performance of construction activities. Show distribution on Cover Page forms. Do not proceed with installation until a copy of Product Data is in the Installer's possession.
    - a. Do not use unmarked Product Data for construction.
- J. Samples: Submit full-size Samples cured and finished as specified and identical with the material proposed. Mount Samples to facilitate review of qualities. Provide samples to the Owner or Construction Manager's on-site office. **Do not deliver to the Architect.**
1. Include the following:
    - a. Specification Section number and reference.
    - b. Generic description of the Sample.
    - c. Sample source.
    - d. Product name or name of the manufacturer.
    - e. Compliance with recognized standards.
    - f. Availability and delivery time.
  2. Submit Samples for review of size, kind, color, pattern, and texture, for a check of these characteristics, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed. Where variations are inherent in the material, submit at least 3 units that show limits of the variations.
    - a. Refer to other Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar characteristics.

## SECTION 01300 – SUBMITTALS

- b. Refer to other Sections for Samples to be incorporated in the Work. Samples must be undamaged at time of use. On the Cover Page, indicate special requests regarding disposition of Sample submittals.
    - c. Samples not incorporated into the Work, or designated as the Owner's property, are the Contractor's property and shall be removed from the site.
  - 3. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 3 sets. One set will be returned marked with the action taken. Maintain sets of Samples, at the Project Site, for quality comparison.
    - a. Unless noncompliance with Contract Documents is observed, the submittal may serve as the final submittal.
    - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
  - 4. Distribution of Samples: Distribute additional sets to subcontractors, manufacturers, and others as required for performance of the Work. Show distribution on Cover Page forms.
- K. Quality Assurance Submittals: Submit quality-control submittals, including design data, certifications, manufacturer's instructions, and manufacturer's field reports required under other Sections of the Specifications.
  - 1. Certifications: Where certification that a product or installation complies with specified requirements is required, submit a notarized certification from the manufacturer certifying compliance.
    - a. Signature: Certification shall be signed by an officer authorized to sign documents on behalf of the company.
- L. Architect's Action: Except for submittals for the record or information, where action and return are required, the Architect will review each submittal, mark to indicate action taken, and return. Compliance with specified characteristics is the Contractor's responsibility.
  - 1. Action Stamp: The Architect will stamp each submittal with an action stamp. The Architect will mark the stamp appropriately to indicate the action taken.
  - 2. Unless requested and paid by the submission contractor, all submittals will be returned by email. All review times start when the Architect receives the submission in his office.

## SECTION 01300 – SUBMITTALS

3. “Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with requirements of the drawings and specifications. This check is only for the review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for verifying quantities, dimensions, field conditions and coordinating all work, information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the work of all trades; and for performing work in a safe and satisfactory manner. Review does not authorize changes to contracts sum, or project completion date unless stated on separate letter or change order. Refer to the A201 Contract, including but not limited to sections 3.2, 3.3, 3.5, 3.12 and 4.2.7.”
- M. **The Contractor shall be responsible to note in the Cover Page of the shop drawings any changes or deviations from the contract documents. This is to include but is not limited to manufacturers, electrical, plumbing, mechanical and structural requirements. The Contractor shall be responsible to distribute to all effected contractors and subcontractors all shop drawings which may affect their work.**
- N. Deviations from the construction documents must be noted by the General Contractor at the time of shop drawing submission. Failure to do so will result in the implication of Section 3.2 of the General Conditions and Paragraphs 3.2.1, 3.2.2 and 3.2.2.1.
- O. Approval of shop drawings is conditional upon the contractor fully and completely complying with all review comments by the Owner, Architect, and Engineer. Where the contractor fails to or is unable to fully and completely comply with every review comment, then the shop drawings are *disapproved* (whether or not they are stamped or noted as "approved" in any manner in any review comment) and must be resubmitted as within seven (7) days. Immediately upon receipt of shop drawing review comments, the contractor is responsible for carefully reviewing all comments in detail and for complying with comments. Where unable to fully satisfy any comment or where the contractor takes exception to any comment, revise and resubmit acceptable shop drawings (or, where taking exception, notify the Architect / Engineer in writing) within seven (7) days. Where the contractor fails to comply with these requirements (including resubmitting/notifying within the seven (7) day period specified), the contractor shall provide acceptable equipment meeting all specified requirements and all review comments (including removing unacceptable equipment [if installed] and replacing with acceptable equipment) at no cost to the Owner.
- P. **No extra claims, time or compensation shall be granted under any circumstance associated with any party's failure or delay in properly submitting, transmitting, obtaining, reviewing, and/or coordinating shop drawings.**

### 2.1 SUBSTITUTIONS

- A. Substitution submittals shall be made **no later than 30 days after Notice to Proceed** in order to provide time for comparison review. All submittals after 30 days shall be in strict accordance with the basis of design / specified products. **No Substitutions will be considered after 30 days.**

## SECTION 01300 – SUBMITTALS

- B. Materials and equipment manufacturers and catalog numbers specified constitute the type and quality of design, material, workmanship, ruggedness of construction, resistance to vandalism, exact operating and performance characteristics, features, configuration, dimensions, etc. The Architect / Engineer will consider substitutions of similar equipment superior to specified equipment (meeting or exceeding all characteristics of the specified equipment).
- C. Submit shop drawings associated with substitutions complete with **comparison documentation** necessary to establish compliance with the basis of design. Submit samples of substitutions where requested. If comparison documentation and/or samples are not submitted when required, the request for substitution will be denied.
- D. Determination of compliance with specifications rests with the Architect/ Engineer. When a request for substitution is denied, furnish the equipment specified. The Architect's / Engineer's decisions in cases of substitutions are final and binding upon the contractor, provide equipment accordingly. No claims for time delay, contract extensions or cost will be considered.
- E. Pay all costs associated with a substitution where granted. For the provisions of this section, "substitutions" includes equipment where characteristics or operation vary significantly from equipment specified (including equipment of the specified manufacturer). This includes costs incurred by any party (Contractor, Sub-contractors, Owner, Architect, Engineers, etc.), costs resulting from differences of details, configuration, ratings, operation, characteristics, and dimensions between the specified and substituted equipment, costs to provide features of the specified equipment which may be manufacturer's options of the substituted equipment, and costs to remove and replace work already installed and any other remedial work as a result of substitutions. Approval of substitutions is conditional upon there being no cost change to the contract, unless specifically indicated on the shop drawings submittal and corresponding approval. The Contractor is fully responsible for coordinating with the Owner, Architect, and other trades to identify all possible cost impacts associated with any substitution before releasing equipment and before any party proceeds with work effected by the substitution.
- F. Submit bid based on the items as specified. Substitutions will be considered only after a contract has been awarded.
- G. "Or Equal" substitutions are permitted so long as they are equal to or superior to the basis of design and the Contractor takes full responsibility for all coordination and costs associated with collateral issues related to the substitution. No Substitutions will be reviewed during the bidding process. The Contractor takes full responsibility for all substitutions.

END OF SECTION 01300



**Contractor's Letterhead**  
**Contractor's Letterhead to Include Name, Physical Address,**  
**Telephone Number and Fax Number**  
**SHOP DRAWING COVER PAGE**

Project Name  
Date

Garrison Architects  
Architect's Name  
713 Creek Road  
Bellmawr, NJ 08031

Sub Contractor's Name, Physical Address, Telephone Number and Fax Number  
Supplier's Name, Physical Address, Telephone Number and Fax Number  
Manufacturer's Name, Physical Address, Telephone Number and Fax Number  
Specification Number and Specification Title and Section  
Construction Document Plan Drawing Number and Detail Reference  
Contractor's Quality Assurance Signature

Check one of the following:

- The signature above certifies that the enclosed submittal is in conformance with the construction documents and in fact is the **exact** product and manufacturer specified. The signature confirms that the Contractor is responsible for dimensions and quantities that have been field verified and that the Shop Drawing will be distributed to all affected Contractors whose work may be affected by the material or equipment enclosed.
- The signature above certifies that the enclosed submittal is in conformance with the construction documents and in fact a **substitution** of the product and manufacturer specified. The Contractor shall provide all Substitutions no later than thirty (30) days from Notice to Proceed and fully comply with page 01300, paragraph 2.1. A complete comparison document must be provided. The signature confirms that the Contractor is responsible for dimensions and quantities that have been field verified and that the Shop Drawing will be distributed to all affected Contractors whose work may be affected by the material or equipment enclosed.

The Contractor assumes responsibility to fully comply with Specification Section 01300, Submittals," and note below any changes or deviations that have resulted from the proposed product substitution. The Contractor also is solely responsible to communicate these changes to all other Prime Contractor and Sub Contractors following review by the Architect / Engineer.

SHOP DRAWING NO	Date	Reviewed By	
RECEIVED FROM GC		Reviewed	
SENT TO ENGINEER		Provide as Corrected	
RETURN FROM ENG		Revise and Resubmit	
RETURN TO GC		Rejected	

Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. The contractor is responsible for all corrections indicated. This check is only for the review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for verifying quantities, dimensions, field conditions and coordinating all work; including all electric for all HVAC and all other equipment; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the work of all trades; and for performing work in a safe and satisfactory manner. Review does not authorize changes to contracts sum, or project completion date. Refer to the A201 contract, including but not limited to sections 3.2, 3.3, 3.5, 3.12, and 4.27. The contractor shall provide all portions of the work per the manufacture's installation recommendations and instructions.





**REQUEST FOR SUBSTITUTION:**

Submit this form for each requested substitution. Fill in all blanks, check all boxes that apply and attach all necessary supporting data.

SUBSTITUTION NO.: \_\_\_\_\_

Specified Item: \_\_\_\_\_

Specification Section(s)/Paragraph(s): \_\_\_\_\_

Drawing Number(s): \_\_\_\_\_

Proposed Substitute: \_\_\_\_\_

(Include, as applicable, manufacturer's name and address, trade name and model number of product, and name of fabricator or supplier.)

Reason for Proposed Substitution: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Net Change to Contract Sum: \_\_\_\_\_  No Change;  Deduct \$ \_\_\_\_\_

Change to Contract Time: \_\_\_\_\_  No Change;

The following required supporting documents are attached (Check all that apply) Items with a \* are mandatory requirements for consideration.:

- \*Complete Product Data
- \*Itemized comparison of properties of proposed product to specified product.
- \*List of other projects on which proposed has been used, with project name, design professional's name and phone number, as well as owner contact name and phone number.
- List of maintenance services and replacement materials available.
- \*Statement of effect of substitution on construction schedule.
- \*Description of change that will be required in other work or products if substitute product is approved.

ADDITIONAL INFORMATION:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**REQUEST FOR SUBSTITUTION:**

The undersigned testifies that he/she:

- Is submitting this substitution request within the limits set forth in the Contract Documents.
- Has investigated the proposed product and determined that it is equal or better than the specified product.
- Will provide the same warranty for the proposed product as for the specified product.
- Will coordinate installation and make other changes as required for the work to be complete in all respects, including: (a) redesign and (b) additional components and capacity required by other work affected by the change.
- Waives all claims for additional costs for evaluation of the substitution request, redesign if required, and reapproval by authorities having jurisdiction, if required.
- Waives reimburse the Owner for additional costs for evaluation of the substitution request, redesign if required, and reapproval by authorities having jurisdiction, if required.

Contractor's Signature: \_\_\_\_\_

Typed or Printed Name: \_\_\_\_\_

Title: \_\_\_\_\_

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

Address: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Owner Approval: \_\_\_\_\_ Date: \_\_\_\_\_

Construction Manager Approval (If Applicable): \_\_\_\_\_ Date: \_\_\_\_\_

Garrison Architects Approval: \_\_\_\_\_ Date: \_\_\_\_\_

Consulting Engineer Approval: \_\_\_\_\_ Date: \_\_\_\_\_

## SECTION 01310 - CONSTRUCTION PROGRESS DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Preliminary Construction Schedule.
  - 2. Contractor's Construction Schedule.
  - 3. Submittals Schedule.
  - 4. Daily construction reports.
  - 5. Material location reports.
  - 6. Field condition reports.
  - 7. Special reports.

#### 1.3 UBITTALS

- A. Submittals Schedule: Submit six copies of schedule. Arrange the following information in a tabular format:
  - 1. Scheduled date for first submittal.
  - 2. Specification Section number and title.
  - 3. Submittal category (action or informational).
  - 4. Name of subcontractor.
  - 5. Description of the Work covered.
  - 6. Scheduled date for Architect's and Construction Manager's final release or approval.
- B. Contractor's Construction Schedule: Submit in accordance with Specification Section 01315 "CPM SCHEDULE".
- C. Daily Construction Reports: Submit three copies at weekly intervals.
- D. Material Location Reports: Submit three copies at weekly intervals.
- E. Field Condition Reports: Submit three copies at time of discovery of differing conditions.
- F. Special Reports: Submit three copies at time of unusual event.

#### 1.4 QUALITY ASSURANCE

- A. Scheduling Work Session: Conduct a Scheduling Work Session at the Project site to comply with requirements in Specification Section 01315 "CPM SCHEDULE".

## SECTION 01310 - CONSTRUCTION PROGRESS DOCUMENTATION

### 1.5 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
  - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
  - 2. Initial Submittal: Submit prior to initial application for payment. Submit concurrently with preliminary bar-chart schedule or network diagram. Include all submittals in the schedule. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.
  - 4. Shop drawing log and schedule is to be updated and submitted at each job meeting along with job meeting report form.

### 2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

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1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
  2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
  4. Startup and Testing Time: Include not less than 30 days for startup and testing.
  5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
  2. Work under More Than One Contract: Include a separate activity for each contract.
  3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  6. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use of premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e. Fabrication.
    - f. Sample testing.
    - g. Deliveries.
    - h. Installation.
    - i. Tests and inspections.
    - j. Adjusting.

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- k. Curing.
    - l. Startup and placement into final use and operation.
  - 8. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Structural completion.
    - b. Permanent space enclosure.
    - c. Completion of mechanical installation.
    - d. Completion of electrical installation.
    - e. Substantial Completion.
  - 9. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- E. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
  - 1. Contractor shall assign cost to construction activities on the CPM schedule. Costs shall not be assigned to submittal activities unless specified otherwise but may, with Architect's approval, be assigned to fabrication and delivery activities. Costs shall be under required principal subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
  - 2. Each activity cost shall reflect an accurate value subject to approval by Architect.
  - 3. Total cost assigned to activities shall equal the total Contract Sum.
  - 4. The General Contractor will not be required to cost load the CPM Schedule.
- F. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragments to demonstrate the effect of the proposed change on the overall project schedule.

### 2.3 CONTRACTOR'S DETAILED CONSTRUCTION SCHEDULE

- A. The Contractor with their scheduling consultant will meet with all Prime/Subcontractors and Construction Manager within 7 days after the pre-construction meeting for the purpose of identifying all the scheduling input required for the Contractor to produce the Detailed Schedule. The Detailed Schedule will then be prepared for review within seven (7) calendar days of the meeting. All Prime/Subcontractors and Construction Manager shall review the schedule and note any corrections required as a condition of approval within seven (7) calendar days of receipt. The Contractor will prepare a finalized copy of the Detailed Schedule acknowledging their acceptance of the Schedule as their plan to construct the project. The approved, accepted Detailed Schedule will be the Contract Document used by Construction Manager to monitor the progress of the Prime/Subcontractor(s). Subsequent meetings may be required with Construction Manager and all Prime/Subcontractors. All comments on the schedule will be sent to the Contractor and Construction Manager simultaneously.

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1. The Detailed Schedule shall comply with the various limits imposed by the scope of work and by any contractually specified intermediate milestone dates and completion dates included in the contract. The degree of detail shall be to the satisfaction of Construction Manager.
2. Activity durations will be in workdays and will have a maximum duration of twenty (20) WORKING DAYS, except in the case of non-construction activities such as procurement of materials and delivery of equipment. The project calendar shall consider and reflect planned non-workdays for weekends, holidays, weather days, and planned premium work such as shift work and extended workdays. Milestones will be clearly identified. Intermediate milestones will be required including but not limited to anchor bolt setting, structural steel delivery/erection, sequencing of building areas, building enclosure, overhead rough-in, phased completion of various areas, etc. The Contract Completion date shall be fixed using a constraint.
3. The Contractor will furnish Construction Manager and each Prime/Subcontractor with a copy of the initial Detailed logic diagram, computer printouts, detailed bar chart and summary bar chart. Construction Manager will also receive electronic versions of the entire schedule and any updates on floppy disk.
4. If the Contractor fails to produce an acceptable Schedule as determined by Construction Manager, Construction Manager may takeover the scheduling requirements and deduct the cost of same from the Contractor's contract sum.
5. In the event a dispute arises regarding the interpretation of the Contract CPM Scheduling requirements; Construction Manager will make the final decision as to interpretation.
6. The activities will be coded to facilitate selection, sorting and preparation of reports. Each activity will have a unique number and description. All construction activities shall be manpower, man-hour and resource loaded. The following activity coding scheme should be used:
  - Contract Number – Contract number if multiple prime.
  - Responsibility – Identify Contractor, Sub-contractor, Owner, etc.
  - Phase – Phase identification from the phasing plan
  - Area – Subdivide schedule activities into logical sections including site, building areas, wings, floors, etc.
  - CSI – 6 digit, 33 division CSI format to be assigned.
  - Procurement activities to be separate and include all major submittals, approvals and fab/del times and shall be logically tied to the appropriate installation activity.
  - Coordination and shop drawing logic shall be tied to the submittals.
7. The following computer outputs may be required by Construction Manager as part of the initial schedule submission, and each MONTHLY update thereafter: Contractor shall provide Construction Manager with a computer disk of the schedule with each submission. All logic changes shall be noted by the consultant in a narrative report that shall also provide an executive summary of the project status.
  - Critical Activity Sort (float equals 10 day or less)
  - Early start sort
  - Eight (8) week "Look Ahead" detailed bar chart with narrative on critical path & milestones.
  - Summary bar chart

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- COM logic diagram (for baseline purposes) and a new logic diagram if logic is revised after baseline is approved.
  - Additional computer sorts as required by Construction Manager
  - Copies shall be provided for each prime contractor
  - One week filter to be used at weekly Foreman's Meeting.
8. The schedule shall show: Activity ID, Activity Description, Original Duration, Remaining Duration, Percent Complete, Early Start, Early Finish, Late Start, Late Finish and Total Float.

### B. SCHEDULE UPDATE

1. Each Prime/Subcontractor is required to attend and participate in a CPM update review meeting with the Contractor and Construction Manager on a monthly basis. Attendance is mandatory and every effort will be made to have the scheduling meetings immediately following a job meeting. Each Prime/Subcontractor will supply update information including a complete and accurate report of procurement items, and work activities. If the information is not submitted, Construction Manager will provide information available at the time of the meeting. The schedule update information will include, but not be limited to:
- a. Actual start dates
  - b. Actual completion dates
  - c. Activity percent completion with actual start date
  - d. Remaining duration of activities in progress
2. All schedule update information outlined above will be reviewed by Construction Manager at the update meeting. Contractor shall provide Construction Manager with all reports as specified in previous paragraphs within 5 calendar days of the meeting. No logic, original duration, or other changes shall be made to the initial schedule without approval from Construction Manager.
3. The Contractor shall then prepare an eight (8) week look-ahead bar chart that will be issued to all at the next job meeting. A copy of the other scheduling documents will be available to each Prime Contractor for review at the jobsite trailer.
4. Issue the draft update by the 25<sup>th</sup> of the month, final versions to be developed, reviewed and accepted by the contractors by the 5<sup>th</sup> of the next month.

### C. RECOVERY SCHEDULE

If a Prime/Subcontractor fails to achieve the planned progress, as indicated in the approved/updated Detailed Schedule and/or the Prime/Subcontractor's lack of progress delays attaining intermediate milestone by more than ten (10) calendar days (monthly or cumulatively); the Prime/Subcontractor will submit to Construction Manager for approval a proposed Recovery Schedule indicating how the Prime/Subcontractor will recover the time lost.



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If a Prime/Subcontractor fails to submit a Recovery Schedule and/or fails to cooperate with the Recovery Schedule process, the Construction Manager can immediately order the Prime/Subcontractor to accelerate completion of the late activities by whatever means necessary, including additional personnel, equipment, overtime, double shifts, etc., without any additional costs to the Owner. The Owner/Construction Manager can withhold future progress payments until the Contractor's progress is in compliance with the contract schedule or has approved proposed adjustments to the contract milestones, extension of contract time or modification of the contract schedule.

1. Near the end of the job, Construction Manager may direct the Contractor to establish a detailed work to complete schedule that is updated on a weekly basis.

### 2.4 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  1. List of subcontractors at Project site.
  2. List of separate contractors at Project site.
  3. Approximate count of personnel at Project site.
  4. Equipment at Project site.
  5. Material deliveries.
  6. High and low temperatures and general weather conditions.
  7. Accidents.
  8. Meetings and significant decisions.
  9. Unusual events (refer to special reports).
  10. Stoppages, delays, shortages, and losses.
  11. Meter readings and similar recordings.
  12. Emergency procedures.
  13. Orders and requests of authorities having jurisdiction.
  14. Change Orders received and implemented.
  15. Change Directives received and implemented.
  16. Services connected and disconnected.
  17. Equipment or system tests and startups.
  18. Partial Completions and occupancies.
  19. Substantial Completions authorized.
- B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

## SECTION 01310 - CONSTRUCTION PROGRESS DOCUMENTATION

### 2.5 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

### PART 3 - EXECUTION

#### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Retain Scheduling Consultant: The contractor may engage, at his option, a consultant to provide planning, evaluation, and reporting of the construction schedule if Contractor does not employ skilled personnel with experience in CPM scheduling and reporting techniques. Qualifications of in-house or scheduling consultant must be submitted for approval.
- B. Meetings: Scheduler shall attend all meetings related to Project progress, alleged delays, and time impact.
- C. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
  - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  - 3. As the Work progresses, indicate Actual Completion percentage for each activity.
- D. Distribution: Distribute copies of approved schedule to Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01310

## SECTION 01315 - CPM SCHEDULE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for the critical path method (CPM) of scheduling and reporting progress of the Work.
- B. The Contractor shall have the primary responsibility for the preparation and maintenance of the CPM schedule and the reporting progress of the overall Work.

#### 1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

#### 1.3 SUBMITTALS

- A. Submittal and Distribution: Within 15 calendar days of the issuance of the Notice to Proceed, the Contractor shall submit 8 copies of the Preliminary Network Diagram, Preliminary Network Diagram reflecting first 60 days of work, and additional items identified in Paragraph 3.1 herein for review and acceptance by the Construction Manager and Architect.
- B. Submittal and Distribution: Within 30 calendar days of the issuance of the Notice to Proceed, the Contractor shall submit 3 copies of the initial CPM Schedule for review and acceptance by the Construction Manager and Architect.
- C. Schedule Updating: Revise the schedule within 7 calendar days after each meeting, or other activity, where revisions have been recognized or made.
  - 1. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.
- D. Distribution: As determined during the Pre-Construction Meeting and as updated during the course of the Work.
  - 1. Distribute printed copies of the Baseline Schedule and updates to the Construction Manager and Architect.
  - 2. Distribute the Baseline Schedule and updates in electronic PRX and PDF formats, by email, to the Construction Manager and Architect. Utilize a unique identifier for each successive update.
  - 3. Post copies of the CPM Schedule in the Project meeting rooms and temporary field offices of each Subcontractor.
- E. Regular Project Meetings: At each regular project meeting the Contractor shall issue the latest updated schedule and a two-week look ahead schedule to each of the participants.
- F. Application for Payments: The Contractor shall issue the latest updated schedule and reports concurrently with each monthly Application for Payment.

## SECTION 01315 - CPM SCHEDULE

- G. Suspension of Payments: The submission and update of the CPM scheduling information is critical to the success of the project and the ability of all parties to manage the work.
  - 1. Initial Submittal: The Owner shall have the right to withhold progress payments from the Contractor until the Baseline Schedule is accepted.
  - 2. Monthly Submittals: The Owner shall have the right to withhold progress payments from the Contractor if s/he fails to update and submit monthly progress schedules and reports as specified.

### 1.4 DEFINITIONS

- A. Critical Path Method (CPM): A method of planning and scheduling a construction project where activities are arranged based on activity relationships and network calculations determine when activities can be performed and the critical path of the Project.
- B. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall project duration.
- C. Network Diagram: A graphic diagram of a network schedule, showing the activities and activity relationships.
- D. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical activities are activities on the critical path.
  - 2. Predecessor activity is an activity that must occur before a given activity and controls the start or finish date of its successor(s).
  - 3. Successor activity is an activity that cannot occur until after the start of a predecessor activity.
- E. Event: An event is the starting or ending point of an activity.
- F. Float: The measure of leeway in activity performance. Accumulative float time belongs to the Owner.
  - 1. Free float: The amount of time an activity can be delayed without adversely affecting the early start of the following activity.
  - 2. Total float: The measure of leeway in starting or completing an activity without adversely affecting the planned project completion date.
- G. Milestone: A key or critical point in time for reference or measurement.

### 1.5 QUALITY ASSURANCE

- A. The Contractor's Scheduling Professional: The Contractor shall retain a scheduling consultant to provide planning, evaluating, and reporting by CPM scheduling.
  - 1. The consultant shall be a recognized specialist, acceptable to the Owner, Construction Manager, and Architect, who is an expert in CPM scheduling and reporting.

## SECTION 01315 - CPM SCHEDULE

2. The consultant shall have computer facilities that are capable of delivering detailed network diagrams within 48 hours of request.
- B. Standards: Comply with procedures contained in AGC's "Construction Planning & Scheduling", latest edition.

### PART 2 - PRODUCTS

#### 2.1 SCHEDULING PROGRAM

- A. Scheduling Program: The Contractor shall use P6 Primavera Project Planner (latest version available) or approved equal for network analysis that has been developed specifically to manage CPM construction schedules.

### PART 3 - EXECUTION

#### 3.1 PRELIMINARY NETWORK DIAGRAM

- A. Scheduling Work Session: Within 7 calendar days of the issuing of the Notice to Proceed the Construction Manager shall facilitate with the Contractor a Scheduling Work Session. The contractor shall provide input to arrive at an integrated CPM Schedule, which integrates construction activities, durations and sequences to facilitate completion in an orderly manner within the time frames indicated for completion, to coordinate the preparation of the Preliminary Network Diagram and the other requirements of this Section.
- B. Preliminary Network Diagram: Within 14 calendar days of the issuing of the Notice to Proceed, the Contractor shall submit a preliminary network diagram. The preliminary network diagram shall outline activities for the first sixty (60) days of construction. Include a summary listing for the remainder of the Work as part of the preliminary diagram.
  1. Include each significant construction activity. Coordinate each activity in the network with other activities. Schedule each construction activity in proper sequence.
  2. Indicate completion of the Work on the date established for Substantial Completion, unless the Owner agrees otherwise.
- C. Cash Requirement Prediction: With submittal of the preliminary work diagram, include a preliminary cash requirement prediction based on indicated activities.
- D. Tabulation of Submittals: With submittal of the preliminary network diagrams, include tabulation by date of all project submittals.
- E. Distribution: Distribute the preliminary network diagram for review and approval as described in Section 01310. Distribute the preliminary network diagram to parties involved early in construction activities, including the Owner, Construction Manager, and Architect.

#### 3.2 BASELINE CPM SCHEDULE

## SECTION 01315 - CPM SCHEDULE

- A. Prepare the Baseline Construction Schedule using the network analysis diagram system known as the critical path method (CPM). Follow procedures outlined in AGC's "Construction Planning & Scheduling."
1. Proceed with preparation of the network diagram immediately following receiving the Notice to Proceed.
  2. Follow the steps necessary to complete development of the network diagram in sufficient time to submit the CPM Schedule so it can be accepted for use no later than 30 calendar days after the issuance of the Notice to Proceed.
  3. Conduct educational workshops to train and inform key project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
  4. Establish procedures for monitoring and updating the CPM Schedule and for reporting progress. Coordinate procedures with foremen's meetings, progress meeting and payment request dates.
- B. CPM Schedule Preparation: Prepare a list of all activities involved in the Project. Include a list of activities required to complete the Work. Provide the best data available for generation of the network diagram and the CPM schedule.
1. Indicate the estimated time duration, sequence requirements, relationship of each activity in relation to other activities. Use "one working day" as the unit of time. Except for fabrication of materials, no single activity shall exceed 15 working days in duration.
  2. Indicate estimated times for the following activities to be performed:
    - a. Preparation and processing of submittals.
    - b. Purchase of materials.
    - c. Delivery.
    - d. Fabrication.
    - e. Installation.
    - f. MEP/FP above ceiling coordination drawing.
  3. Treat each story or separate area as a separate numbered activity for principal elements of the Work.
  4. Provide detailed sub-schedules to define critical portions of the schedule.
  5. Indicate milestone dates of key portions of the work as required by the milestones in Section 01010 and the phasing schedule.
- C. Processing: Enter prepared data to produce a time-scaled logical network. Revise data, reorganize activity sequences, and reproduce as necessary to produce the CPM Schedule within the limitations of Section 01010 and the phasing schedule.
- D. Format: Display the full network on a minimum number of sheets, of sufficient width to show data clearly for the entire construction period. The critical path should be clearly marked and determinable on the diagram.
- E. Initial Issue: Prepare the initial issue of the CPM Schedule network diagram using "Early Start-Total Float" as the sorting criteria. Prepare tabulated reports to show the following:
1. The Contractor or subcontractor and work or activity.
  2. Description of the activity.
  3. Principal events of that activity.

## SECTION 01315 - CPM SCHEDULE

4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in working days.
8. Total float.
9. Average size of workforce per activity.

F. Tabular Report: Prepare and issue 3 tabular reports, sorted as noted.

1. In first report, tabulate and sort by activity number, then by early finish date.
2. In second listing, tabulate and sort by activity number, then by late finish date.
3. In the third report, tabulate and sort by total float, then by early start date.
4. In subsequent issues of these reports, substitute actual start and finish dates for activities completed as of the data date.

G. Prepare listing for ease of comparison with payment requests; coordinate timing with progress meetings.

### 3.3 REVIEW AND EVALUATION OF SCHEDULE

A. Progress Meetings: The progress of the project in conjunction with the CPM Schedule will be discussed at progress meetings. Participate in joint review and evaluation of schedule with Construction Manager and Architect at each meeting.

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

1. Actual completion dates for work items completed during report period.
2. Actual start dates for work items started during report period.
3. Estimating remaining durations for work items in progress.
4. Estimated start dates for work items scheduled to start during month following report period.
5. Changes in duration of work items and minor logic changes.
6. Identification of current and most critical paths to required completion dates.

C. After review, revise as necessary as result of review, and resubmit within 7 calendar days.

### 3.4 UPDATING SCHEDULE

A. Maintain CPM Schedule to record actual start and finish dates of completed activities. The scheduling consultant will provide an update template projecting the next 2 months of work sorted by contractor on the 20th day of each month. / 2. Update activities by : a. Actual Start date / b. Actual completion date / c. Actual start w/ % complete. / d. Do not predict the remaining duration, let the program calculate.

1. Indicate progress of each activity to date of revision, with projected completion date of each activity.
2. Annotate diagrams to graphically depict current status of Work.
3. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
4. Indicate changes required to maintain Date of Substantial Completion.

## SECTION 01315 - CPM SCHEDULE

5. Submit reports required to support recommended changes.
- B. Submit updated schedule with each Application for Payment.
1. Work Item Report: Contain work items and dependencies as indicated on network diagram listed in order or ascending work item number.
  2. Separate listing of activities completed during reporting period.
  3. Separate listing of activities which are currently in progress indicating their remaining duration and percent complete.
  4. Separate listing of activities which are causing delay to work progress.
- C. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Narrative to include impact to the critical path and milestones (i.e. the project is x days behind/ ahead of schedule & why / the contract milestone for phase 1a is xx/xx/xx; the actual milestone date for phase 1a is xx/xx/xx and why) Report corrective action taken or proposed and its effect including the effects of changes on schedules of separate contractors.

### 3.5 RELIANCE ON SCHEDULE

- A. Expediting Activities:
1. Should any critical path activity fail to be completed within 10 calendar days after the indicated schedule date, the Contractor shall expedite completion of activity by whatever means Owner deems appropriate and necessary without additional compensation to the Contractor.
  2. Should any critical path activity performed be 28 or more calendar days behind schedule, the Owner shall have the right to perform activity or have activity performed by whatever method Owner may deem appropriate. Costs incurred by Owner in this activity shall be deducted from the Contract Price.
  3. It is expressly understood and agreed that failure by the Owner to exercise the option to expedite an activity shall not be construed as precedent for any other activities or as waiver of the Owner's rights to exercise his rights on subsequent occasions.
- B. Contract Extensions: Float time is not for exclusive benefit of either Owner or Contractor.
1. Extensions of time for Contract performance as specified in Contract shall be granted only to the extent that equitable time adjustments to affected work items exceed total float time along affected paths of accepted computer printout report in effect at that time.
  2. Slippage of work items will not be the basis for time extensions to the Contract unless, and until, such slipped work items are resolved in accordance with General and Supplementary Conditions.

END OF SECTION 01315



## SECTION 01400 - QUALITY REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

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

#### 1.2 DEFINITIONS

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

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- G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five (5) previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

### 1.3 CONFLICTING REQUIREMENTS

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

### 1.4 SUBMITTALS

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

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

### 1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for 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 regulations governing the Work.

## SECTION 01400 - QUALITY REQUIREMENTS

- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. 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.
- I. 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.
- J. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in the Contract Documents.

### 1.6 QUALITY CONTROL

- A. Contractor Responsibilities: Quality-control services are the Contractor's responsibility. The Owner will hire and pay for a qualified testing agency to perform these services but it is the Contractor's responsibility to coordinate and remedy any non-conforming work. Additional tests that are required resulting from any non-conforming work shall be paid for by the Contractor.
1. Contractor will furnish the Architect and Owner with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
  3. The Owner will engage a qualified Special Inspector to conduct special tests and inspections oversight in accordance with DCA Bulletin 03-5. The Owner's special inspection services will not relieve the Contractor of responsibility for certifying the work and completing the contract work in accordance with the Contract Documents.

## SECTION 01400 - QUALITY REQUIREMENTS

- B. The Contractor shall provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required by authorities having jurisdiction, whether specified or not.
1. The Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  3. Submit a certified written report, of each quality-control service to the Construction Manager, Architect, Owner, Special Inspector and authorities having jurisdiction.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Retesting/Reinspecting: The Contractor shall provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, Owner's Special Inspector and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.

## SECTION 01400 - QUALITY REQUIREMENTS

7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
  1. Schedule times for tests, inspections, obtaining samples, and similar activities.

### 1.7 SPECIAL TESTS AND INSPECTIONS (BY OWNER)

- A. Special Tests and Inspections: Owner will engage a qualified **Testing Agency/Special Inspector** to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner in accordance with DCA Bulletin 03-5, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified **Testing Agency/Special Inspector** as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
  1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
  2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
  4. Review test and inspection reports completed by the Contractor's Quality Assurance and Quality Control qualified testing agency. Any irregularities or deficiencies shall be brought to the attention of the Contractor and Architect immediately.
  5. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  6. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
  7. Retesting and reinspecting corrected work.

### PART 2 - PRODUCTS (Not Used)

### PART 3 - EXECUTION

#### 3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

SECTION 01400 - QUALITY REQUIREMENTS

2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.
- D. The following items shall be tested in accordance with this section if not specifically listed in the Contract Documents as applicable to the Work:
  1. Concrete
  2. Structural Steel

END OF SECTION 01400





## SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

### 1.1 GENERAL

- A. Summary: This Section specifies construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection facilities.
- B. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
  - 1. Building code requirements.
  - 2. Health and safety regulations.
  - 3. Utility company regulations.
  - 4. Police, fire department and rescue squad rules. Local traffic requirement.
  - 5. Environmental protection regulations.
  - 6. New Jersey Department of Education.
  - 7. ADA requirements.
  - 8. OSHA.

The Contractor may be required to pay for and obtain building permits, temporary construction trailer permits, etc. as required by the local construction code office.

- C. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."
  - 1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."
- D. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.
- E. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. Submit reports and tests, inspections, meter readings, and procedures performed on temporary utilities. At the earliest time, change over from use of temporary service to use of permanent service.

### 1.2 PRODUCTS

- A. Materials: Provide new materials. If acceptable to the Architect, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
  - 1. Lumber and Plywood: Comply with Division 6 Section "Rough Carpentry." Provide UL-labeled, fire-treated lumber and plywood for temporary offices and sheds. Provide exterior, Grade B-B high density concrete form overlay plywood for signs. Provide 5/8" (16 mm) thick exterior plywood for other uses.

## SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

2. Roofing Materials: Provide UL Class A standard-weight asphalt shingles or UL Class C mineral-surfaced roll roofing on roofs of job-built temporary offices, shops, and sheds.
  3. Paint: Comply with requirements of Division 9 Section "Painting."
    - a. For exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
    - b. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
    - c. For interior walls of temporary offices, provide 2 coats interior latex-flat wall paint.
  4. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
  5. Water: Provide potable water approved by local health authorities.
  6. Open-Mesh Fencing: Provide 0.120-inch- (3-mm-) thick, galvanized 2-inch (50-mm) chain-link fabric fencing 6 feet (2 m) high with galvanized steel pipe posts, 1-1/2 inches (38 mm) I.D. for line posts and 2-1/2 inches (64 mm) I.D. for corner posts.
- B. Equipment: Provide new equipment.
1. Water Hoses: Provide 3/4-inch (19-mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet (30 m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
  2. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
  3. Electrical Power Cords: Grounded extension cords. Use hard-service cords where exposed to abrasion and traffic.
  4. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
  5. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
  6. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.
    - a. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

## SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

### 1.3 EXECUTION

- A. Installation, General: Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
1. **Provide each facility ready for use when needed to avoid delay.** Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
  2. Conditions of Use: Keep temporary facilities clean and neat in appearance. Operate safely and efficiently. Relocate as the Work progress. Do not overload facilities or permit them to interfere with progress. Take necessary fire prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.
- B. Temporary Utility Installation: The **Contractor** shall Engage the local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
  2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
  3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
  4. Use Charges: The Owner will be responsible for the temporary utility use costs for the utilities supplied through the existing permanent service to the building. This will include both water and electric usage costs. The contractor will be responsible for the cost of material and labor to hook-up and maintain the temporary services through Substantial Completion.
  5. Temporary Water Service: (Installed and maintained by Contractor). Install temporary water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use. If temporary water is connected to the Owner's line, the Owner will be responsible for the usage cost for the water that is supplied through the building's permanent services.
  6. Temporary Electric Power Service: (installed and maintained by Contractor). Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear. The Owner will be responsible for the electrical usage cost for power that is supplied through the building's permanent service.
    - a. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage.
    - b. Temporary Lighting: Provide temporary lighting with local switching to fulfill security requirements and illumination for construction operations and traffic conditions.

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- c. If temporary power/lighting connect to the Owner's panel, the Contractor shall compensate the Owner for the electrical usage.
  - d. Under no circumstances will the temporary electric be turned off due to labor disputes, work hours, etc. **If any Prime Subcontractor wants to or is working second shift, Saturdays, Holidays, or any other time, temporary electric shall be provided by the Contractor and usage paid for by the Contractor at no additional cost.**
- C. Temporary Heat: (installed and paid of usage by Contractor). Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Temporary heat must be on to dry out masonry walls at least two weeks prior to painting. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy. All temporary heat must be on by **November 11<sup>th</sup>**. Anywhere in the building, the minimum temperature is to be 60 degrees Fahrenheit.
- 1. Heating Facilities: **The use of the building's permanent HVAC systems is prohibited and shall not be used. The building must be 100% white glove clean and dust free prior to starting the HVAC system.** Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP-gas or fuel-oil heaters with individual space thermostatic control. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.
  - 2. Safety Requirements: provide a fire extinguisher for each heating unit. Comply with all local, governmental and manufacturer's requirements for safe operation.
- D. Temporary Telephones: The Contractor shall be responsible for their own telephone service.
- E. Sanitary Facilities: (installed and paid for maintenance by Contractor). Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.
- 1. Toilets: Install self-contained, single occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass fiber reinforced polyester steel or similar nonabsorbent material. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted. The construction team is not permitted to use the school facilities at any time. Provide separate facilities for male and female personnel. Provide the number of units as required by code.
- F. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.
- 1. Provide safety showers, eyewash fountains, and similar facilities for convenience,

## SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

safety, and sanitation of personnel.

- G. Support Facilities Installation: Locate field offices, storage sheds, and other temporary construction and support facilities for easy access. Maintain facilities until near Substantial Completion. Remove prior to Substantial Completion. If the Contractor wants their own offices, they may provide them. The location will be determined by the Owner.
1. Construction Manager, Owner's Field Office: **NOT REQUIRED**
  2. A separate construction trailer shall be provided for the Contractor's use.
  3. Provide incombustible construction for offices, shops, and sheds located within the construction area or within 30 feet (9 m) of building lines. Comply with requirements of NFPA 241.
  4. Storage and Fabrication Sheds: (Contractors): Install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on-site.
  5. Dewatering Facilities and Drains: (by Contractor). For temporary drainage and dewatering facilities and operations, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water.
  6. Temporary Enclosures: (by Contractor). Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
    - a. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 sq. ft. (2.3 sq. m) or less with plywood or similar materials.
    - b. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
  7. Temporary Lifts and Hoists: The Contractor shall provide facilities for hoisting their own materials.
  8. Project Signs: The Contractor shall furnish and install 4' x 8' project identification and other signs where indicated to inform the public and persons seeking entrance to the Project. Support on framing of preservative treated wood or steel. Do not permit installation of unauthorized signs. Engage an experienced sign painter to apply graphics. Comply with details indicated. The content of sign shall be similar to the cover sheet of the drawings plus all prime subcontractors' names.
  9. Temporary Exterior Lighting: (Contractor) Install exterior yard and sign lights so signs are visible when Work is being performed.
  10. Collection and Disposal of Waste: (Contractor). The Contractor shall collect their own waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris.

## SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

Enforce requirements strictly.

- a. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C).
11. Pest Control: (by Contractor). Retain an exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and control procedures at regular intervals so the Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- H. Access to the building pad (by the Contractor): The Contractor shall provide and maintain through the construction project a stoned access roadway for vehicles and deliveries to the building pad and as required around the building pad. This temporary access roadway shall be installed at the beginning of the project and be removed at the end of the project with the area affected fully restored.
- I. Security and protection facilities installation: (by Contractor). Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Architect.
1. Temporary Fire Protection: (by Contractor). Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
    - a. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
    - b. Store combustible materials in containers in fire-safe locations.
    - c. Prohibit smoking in hazardous fire-exposure areas.
    - d. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
  2. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
  3. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
  4. Enclosure Fence: Before excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated or enclose the entire site or the

## SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.

- a. Provide open-mesh, chain-link fencing with posts set in a compacted mixture of gravel and earth.
  - b. Provide plywood fence, 8 feet (2.5 m) high, framed with four 2-by-4-inch (50-by-100-mm) rails, and preservative-treated wood posts spaced not more than 8 feet (2.5 m) apart.
  - c. The Contractor shall provide a temporary construction fence whether shown on the contract documents or not as required to separate the area or areas under construction from the Owner's area or areas used by the public. The temporary fencing shall be approved by the Owner prior to installation.
5. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
6. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.
- J. Operation: The Contractor shall be responsible to enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- K. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements. Maintain temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- L. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- M. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.
  2. At Substantial Completion, clean and renovate permanent facilities used during the

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construction period including, but not limited to, the following:

- a. Replace air filters and clean inside of ductwork and housings.
  - b. Replace significantly worn parts and parts subject to unusual operating conditions.
  - c. Replace lamps burned out or noticeably dimmed by hours of use.
3. Prior to Final Completion, restore site damages resulting from construction activities. This includes, but is not limited to: removal of temporary fencing; restoring site disturbance resulting from contractor parking, trailers, sanitary facilities, dumpsters, construction equipment, etc. Site restoration to include fine grading with approved topsoil and reseeded with approved seed.

END OF SECTION 01500



## 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 construction waste.
  - 2. Recycling nonhazardous construction waste.
  - 3. Disposing of nonhazardous construction waste.
- B. Related Sections include the following:
  - 1. Division 1 Section "Temporary Facilities and Controls" for environmental-protection measures during construction.
  - 2. Division 2 for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.
  - 3. Division 4 Section "Unit Masonry Assemblies" for disposal requirements for masonry waste.

#### 1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. 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.
- C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- D. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- E. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

#### 1.4 PERFORMANCE GOALS

- A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 50 percent by weight of total waste generated by the Work.

## SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

- B. Salvage/Recycle Goals: Owner's goal is to salvage and recycle as much nonhazardous construction waste as possible including the following materials:

1. Construction Waste:

- a. Site-clearing waste.
- b. Masonry and CMU.
- c. Lumber.
- d. Wood sheet materials.
- e. Wood trim.
- f. Metals.
- g. Roofing.
- h. Insulation.
- i. Carpet.
- j. Gypsum board.
- k. Piping.
- l. Electrical conduit.
- m. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
  - 1) Paper.
  - 2) Cardboard.
  - 3) Boxes.
  - 4) Plastic sheet and film.
  - 5) Polystyrene packaging.
  - 6) Wood crates.
  - 7) Plastic pails.

### 1.5 SUBMITTALS

- A. Waste Management Plan: Submit 3 copies of plan within 30 days of date established for the Notice to Proceed.
- B. 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.

### 1.6 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 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
  1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.

## SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

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.

### 1.7 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. 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 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 Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
  2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
  3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
  4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
  5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
  6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.
- D. Forms: Prepare waste management plan on forms included at end of Part 3.

## SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

### PART 2 - PRODUCTS (Not Used)

### PART 3 - EXECUTION

#### 3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by 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 and Controls" for operation, termination, and removal requirements.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. 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 everyone concerned within three days of submittal return.
  - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. 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 Reuse in the Work:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers.
  - 3. Store items in a secure area until installation.
  - 4. Protect items from damage during transport and storage.
  - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: Not permitted on Project site.

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- C. Salvaged Items for Owner's Use:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers.
  - 3. Store items in a secure area until delivery to Owner.
  - 4. Transport items to Owner's storage area on-site.
  - 5. Protect items from damage during transport and storage.
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

### 3.3 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and 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. Do not store within drip line of remaining trees.
  - 4. Store components off the ground and protect from the weather.
  - 5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

### 3.4 RECYCLING DEMOLITION WASTE

- A. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
  - 1. Pulverize concrete to maximum 4-inch (100-mm) size.
- B. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
  - 1. Clean and stack undamaged, whole masonry units on wood pallets.
- C. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

## SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

- D. Metals: Separate metals by type.
  - 1. Structural Steel: Stack members according to size, type of member, and length.
  - 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- E. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- F. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
  - 1. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.
- G. Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
  - 1. Store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- H. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- I. Conduit: Reduce conduit to straight lengths and store by type and size.

### 3.5 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. Site-Clearing Wastes: Chip brush, branches, and trees on-site.
- C. Wood Materials:
  - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
  - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
  - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

## SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

### 3.6 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.
- C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 01524





## SECTION 01600 - MATERIALS AND EQUIPMENT

### 1.1 GENERAL

- A. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock.
1. "Named Products" are items identified by the manufacturer's product name, including make or model number or designation, shown or listed in the manufacturer's published product literature.
- B. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
- C. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.
- D. Product List: Products required are included in all sections of these specifications. Provide the manufacturer's name and proprietary product names for each item. Coordinate product list with the Contractor's Construction Schedule and Submittal Schedule.
1. Form: Prepare product list with information on each item tabulated under the following column headings:
    - a. Related Specification Section number.
    - b. Generic name used in Contract Documents.
    - c. Proprietary name, model number, and similar designations.
    - d. Manufacturer's name and address.
    - e. Supplier's name and address.
    - f. Installer's name and address.
    - g. Projected delivery date or time span of delivery period.
  2. Within 30 days after date of commencement of the Work, submit 3 copies of the product list. Provide a written explanation for omissions of data and variations from Contract requirements.
  3. The Architect will respond within 2 weeks of receipt of the list. No response within this period constitutes no objection to listed manufacturers or products but does not waive the requirement that products comply with Contract Documents. The Architect's response will include a list of unacceptable products.
- E. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
1. When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected.
- F. Nameplates: Except for required labels and operating data, do not attach manufacturer's nameplates or trademarks on surfaces exposed to view in occupied spaces or on the exterior.

## SECTION 01600 - MATERIALS AND EQUIPMENT

1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
  2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
    - a. Name of product and manufacturer.
    - b. Model and serial number.
    - c. Capacity.
    - d. Speed.
    - e. Ratings.
- G. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
1. Schedule delivery as early as possible. Coordinate with installation to assure safety for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  2. Deliver products in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  3. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
  4. Store products to facilitate inspection and measurement of quantity or counting of units. Store heavy materials away from the structure in a manner that will not endanger the supporting construction.
  5. Store products subject to damage by the elements aboveground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

### 1.2 PRODUCTS

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
  2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. Product Selection Procedures: Procedures governing product selection include the following:

## SECTION 01600 - MATERIALS AND EQUIPMENT

1. Proprietary Specification Requirements: Where products are specified by name, accompanied by the term "or equal" or "or approved equal" comply with specified product standards and data to obtain approval for use of an unnamed product. See Specification Section 01300, "Submittals," page 01300-6 and 01300-7, Paragraph 2.1 for specific Substitution requirements.
2. Nonproprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning submissions to obtain approval for use of an unnamed product.
3. Descriptive Specification Requirements: Where Specifications describe a product, listing characteristics required, with or without use of a brand name, provide a product that provides the characteristics and otherwise complies with requirements.
4. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply and are recommended for the application. Manufacturer's recommendations may be contained in product literature or by the manufacturer's certification of performance.
5. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
6. Visual Matching: Where Specifications require matching a Sample or existing building items, the Architect's decision on whether a product matches will be final.
7. Visual Selection: Where requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product that complies with other requirements. The Architect / Owner will select the color, pattern, and texture from the product line selected.

### 1.3 EXECUTION

- A. Comply with manufacturer's instructions for installation of products. Anchor each product securely in place, accurately located and aligned with other Work. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600



## SECTION 01700 - CONTRACT CLOSEOUT

### 1.1 GENERAL

- A. Please refer to the **“PROJECT CLOSEOUT CHECKLIST”** at the end of this section for the summary of materials required to complete the contract obligation. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.
- B. Substantial Completion: The Contractor shall request the Owner, Construction Manager (if applicable) and Architect to inspect the job and perform a punch list to certify Substantial Completion. Refer to Specification Section AIA 201 General Conditions of the Contract for Construction, paragraph 9.8, for the definition of Substantial Completion. Before requesting inspection for certification of Substantial Completion, the Contractor shall complete the following:
1. **“PUNCH LIST”**: Before the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list (PUNCH LIST) of items to be completed or corrected. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.
  2. The Contractor shall perform a Quality Control / Quality Assurance QC/QA Punchlist of all work prior to requesting Substantial Completion and a punch list from the Owners Team. The Contractor’s Project Manger shall take the lead and conduct an onsite review with the Contractor’s superintendent and representation from every major sub prime contractor. Notification of this onsite walk thru shall be provided in writing to all members of the Owners Team who may or may not choose to attend. The Contractor’s Project Manager shall record and distribute this QC/QA Punchlist in a matrix that provides an additional column for the Contractor to document the completion of the work and the date. After successful completion of the Contractor’s QC/QA Punchlist and all work, the Contractor shall request the Owners Team perform a Punchlist. Substantial Completion shall be requested in accordance with paragraph 9.8.1 of Specification Section AIA 201 General Conditions of the Contract for Construction,
  3. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the Work claimed as substantially complete.
    - a. Include supporting documentation for completion and an accounting of changes to the Contract Sum.
  4. Advise the Owner of pending insurance changeover requirements.
  5. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
  6. Submit record drawings, maintenance manuals, and, if specified elsewhere, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
  7. Deliver tools, spare parts, extra stock, and similar items.

## SECTION 01700 - CONTRACT CLOSEOUT

8. Changeover locks and transmit keys to the Owner.
  9. Changeover temporary construction utilities to Owner including electric, water, gas, sewer, storm, fire protection, etc.
  10. Complete startup testing of systems and instruction of operation and maintenance personnel. Remove temporary facilities, mockups, construction tools, and similar elements.
  11. Complete final cleanup requirements, including touchup painting.
  12. Touch up and repair and restore marred, exposed finishes.
  13. Submit Certificate of Occupancy/Approval
  12. Remove temporary covered walkway, fence, and complete all curbs, paving, concrete walks, etc.
- C. Inspection Procedures: On receipt of a request for inspection, the Construction Manager will proceed or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. The Construction Manager (if applicable) or Architect will repeat inspection when requested and assured that the Work is substantially complete.
  2. Results of the completed inspection will form the basis of requirements for final acceptance.
- D. Final Acceptance: Please refer to the **“FINAL PAYMENT CHECKLIST”** at the end of this section for the summary of materials required to complete the contract obligation. All **“PROJECT CLOSEOUT CHECKLIST”** items shall be completed before requesting Final Acceptance or Final Payment.
- E. Reinspection Procedure: The Construction Manager will reinspect the Work upon receipt of notice that the Work has been completed, except for items whose completion is delayed under circumstances acceptable to the Owner, Construction Manager and Architect.
1. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance. If the Work is incomplete, the Architect will advise the Contractor of Work that is incomplete or obligations that have not been fulfilled but are required.
  2. If necessary, one (1) reinspection will be provided free of cost to the Contractor. If the Contractor fails to complete the work and a third or subsequent inspections are required, then the Contractor agrees to have the Liquidated Damages Daily Amount deducted from his Contract to pay for all extra inspections.
- F. Record Document Submittals: Do not use record documents for construction. Protect from loss in a secure location. Provide access to record documents for the Construction Manager's (if applicable) / Architect's reference.

## SECTION 01700 - CONTRACT CLOSEOUT

- G. Record Drawings: Maintain a set of Original Signed and Sealed Prints of Contract Documents and Shop Drawings in the job trailer accessible to the Local Authority having jurisdiction, Owner, Construction Manager and/or Architect. The drawings shall be updated daily and subject to the penalty of non-payment if they are not up to date. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark the drawing most capable of showing conditions fully and accurately. Give attention to concealed elements.
1. Mark sets with red pencil. Use other colors to distinguish between variations in separate categories of the Work.
  2. Organize record drawing sheets into manageable sets. Bind with durable-paper cover sheets; print titles, dates, and other identification on the cover of each set.
- H. Maintenance Manuals: Organize operation and maintenance documents into two (2) sets of manageable size. Bind in individual, heavy-duty, 2-inch (51-mm), 3-ring, binders, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include all the information required in the **“PROJECT CLOSEOUT CHECKLIST.” Project Closeout Checklist Documents including these Maintenance Manuals shall be delivered to the OWNER OR CONSTRUCTION MANAGER (if applicable).**
- I. Record RFIs (Request for Information): The Contractor shall maintain a complete record of all RFIs in the job trailer accessible to the Local Authority having jurisdiction, Owner, Construction Manager and/or Architect. The RFI Logbook shall be updated daily and subject to the penalty of non-payment if it is not up to date.

### 1.2 PRODUCTS (Not Applicable)

### 1.3 EXECUTION

- A. Operation and Maintenance Instructions: The Contractor shall coordinate and arrange for each Installer/Manufacturer to provide instruction in proper operation and maintenance to the Owner's Staff. Refer to the applicable Specification Section for the requirements of Owner Instruction. The Owner, Construction Manager (if applicable), and Architect shall be notified of this instructional meeting 3 days in advance. The instructional meeting shall include a detailed review, but not be limited to, the following items:
1. Maintenance manuals.
  2. Spare parts, tools, and materials.
  3. Lubricants and fuels.
  4. Identification systems.
  5. Control sequences.
  6. Hazards.
  7. Warranties and bonds.
  8. Maintenance agreements and similar continuing commitments.
- B. As part of instruction for operating equipment, demonstrate the following:

## SECTION 01700 - CONTRACT CLOSEOUT

1. Startup and shutdown.
  2. Emergency operations and safety procedures.
  3. Noise and vibration adjustments.
- C. Final Cleaning: Employ experienced cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Complete the following operations before requesting inspection for certification of Substantial Completion.
1. Remove labels that are not permanent labels.
  2. Clean transparent materials, including mirrors and glass. Remove glazing compounds. Replace chipped or broken glass.
  3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. The Contractor shall clean vinyl composite tile, ceramic tile, terrazzo, sealed concrete, etc. "mop clean." Strip all VCT flooring and apply three coats of wax. Vacuum carpeted surfaces.
  4. Wipe surfaces of mechanical and electrical equipment to a dust free condition. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures and lamps.
  5. Clean the site of rubbish, litter, and foreign substances. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even-textured surface.
- D. Removal of Protection: Remove temporary protection and facilities.
- E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Remove waste materials and dispose of lawfully.
- F. Contractor shall provide an as-built survey of all installed utilities, as well as existing utility features to remain that are uncovered during construction, including locations and elevations. The as-built survey shall be provided as a hard copy plan sheet and in electronic format (AutoCAD or similar file type) on a CD, flash drive or similar acceptable electronic media.

END OF SECTION 01700



## PROJECT CLOSEOUT CHECKLIST

**CONTRACTOR MUST COMPLETE AND SUBMIT (1) ONE SET OF AS-BUILT DOCUMENTS, TWO (2) SETS OF CLOSEOUT BINDERS AND ONE (1) TRAINING VIDEO TO THE OWNER OR CONSTRUCTION MANAGER WITH AN ELECTRONIC COPY OF THE AS-BUILT DOCUMENTS EMAILED TO THE OWNER, CONSTRUCTION MANAGER (if applicable) AND ARCHITECT**

Complete,  
Incomplete or  
N/A

### **AS-BUILT DOCUMENTS - ONE SET per Building Location**

\* All As-Built Documents must be clearly labeled "AS-BUILT" with a date and Contractor's signature. If the Owner has contracted with a Construction Manager, the Contractor must review all As-Built notations with the C.M. prior to delivering to Owner.

1. Record "as-built" contract drawings. (1 paper copy & PDF files emailed to the Owner, Construction Manager (if applicable) and Architect. In lieu of emailing the file, the Contractor can provide a flash drive of the PDF.)
2. Record "as built" shop drawings. (1 paper copy & PDF files emailed to the Owner, Construction Manager (if applicable) and Architect. In lieu of emailing the file, the Contractor can provide a flash drive of the PDF.)

### **CLOSE-OUT BINDERS - TWO SETS per Building Location**

\* All items shall be in a 3-ring loose leaf binder, clearly labeled (minimum: building, discipline/trade & year) on Front and Side Spine. Include a helpful table of contents and index tabs. Also provide this information in a PDF File emailed to the Owner and Construction Manager (if applicable.)

1. Maintenance manuals/operating and maintenance instruction. See Specification Section 01700.
2. Warranties and bond manual. See Specification Section 01740.
  - \* WARRANTY CLARIFICATION: Contractor shall separately identify any warranty that requires execution by Owner or otherwise. "Copies" of warranties should be included in the close-out "binder". "Original" warranties requiring execution should be sent under a separate cover. The separate cover should clearly identify the action required to execute the warranty.
3. List of contact persons for the Contractor and all sub-contractors. Include contract responsibility, name of company, name of person, street address, mailing address (if different), telephone and email address.
4. Copy of final inspection reports / permit closeout document.
5. Attic Stock, Special tools, spare parts, extra stock materials, etc. shall be turned over to Owner. Include a list in the closeout binder.

**OWNER TRAINING VIDEO – ONE COPY per Building Location**  
**FINAL PAYMENT CHECKLIST**

Complete,  
Incomplete or  
N/A

**\* DO NOT submit Final Payment until all items can be included.**

**CONTRACTOR MUST COMPLETE AND SUBMIT (3) THREE SETS OF**  
**COLLATED, NOTARIZED ORIGINALS & (1) ONE COMPLETE**  
**ELECTRONIC COPY VIA EMAIL TO THE ARCHITECT WITH FINAL**  
**PAYMENT APPLICATION:**

1. An Index of Documents Included on the Contractor's Letterhead.
2. Owner Payment Voucher (if required by Owner).
3. AIA Payment Application.
4. AIA Document G706 – 1994 Contractor's Affidavit of Payment of Debts and Claims
5. AIA Document G706A – 1994 Contractor's Affidavit of Release of Liens
6. Contractor's Certification of Completion
7. AIA Document G707 – 1994 Consent of Surety to Final Payment
8. Maintenance Bond for 100% of the Project Cost for a warranty period of two (2) years from the Date of Final Acceptance.
9. The Contractor shall not use any product containing asbestos and all plumbing is lead free. The Contractor shall provide a notarized Letter stating: "No Asbestos containing materials were provided on the project and the plumbing is lead free".
10. Contractor shall furnish a letter agreeing to provide complete parts and labor service and maintenance of all HVAC systems, equipment, devices, controls, etc., for 2 years from date of substantial completion as determined by architect. The letter shall also affirm that the Contractor will provide scheduled maintenance service quarterly (3-month interval) as the maximum time period between scheduled service.
11. Certificate of Occupancy or Acceptance by the Local Construction Official.
12. Provide a Fire Alarm System NFPA Record of Inspection and Testing Certification Form.

**ADDITIONAL REQUIREMENTS TO BE SATISFIED PRIOR TO**  
**CERTIFICATION OF FINAL PAYMENT:**

1. Project Closeout Documents (submit separately as indicated on the Project Closeout Checklist).

## SECTION 01740 - WARRANTIES AND BONDS

### 1.1 GENERAL

- A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.
  - 1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.
  - 2. Requirements for Warranties and Bonds for products and installations that are specified are included in the individual sections of these specifications.
- C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.
- D. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.
- E. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- F. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefitted from use of the Work through a portion of its anticipated useful service life.
- G. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.
  - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  - 2. Where the Contract Documents require a special warranty, or similar commitment, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

## SECTION 01740 - WARRANTIES AND BONDS

- H. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, submit written warranties upon request of the Architect.
  - 1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within 15 days of completion of that designated portion of the Work.
- I. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.
  - 1. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- J. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.
  - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the 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 the Installer.
  - 2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.
  - 3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

END OF SECTION 01740

## SECTION 01770 - SELECTIVE DEMOLITION

### PART 1 - GENERAL

1. Related Documents
  - A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 Summary
  - A. This Section requires the selective removal, salvage to Owner and/or subsequent offsite disposal of the following:
    1. Existing storm drainage pipe, inlets, castings, etc., as indicated on drawings.
    2. Paving, sidewalks concrete and infrastructure as indicated on drawings and as required to accommodate new construction.
    3. Relocation of pipes, conduits, ducts and/or other mechanical and electrical work is specified in other Divisions.
    4. Cutting nonstructural concrete floors and masonry walls for piping, ducts and/or conduits as required to perform the work specified in other Divisions. Refer to the respective mechanical and electrical specification sections for additional demolition requirements.
- 1.3 Submittals
  - A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Section: SUBMITTALS.
  - B. Schedule indicating proposed sequence of operations for selective demolition work to Owner's Representative for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
    1. Provide a detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
    2. Coordinate with Owner's continuing occupation of the existing building.
  - C. Photographs of existing conditions of structures, site equipment and adjacent improvements that might be misconstrued as damage related to removal operations. File with Owner's Representative prior to start of work.
  - D. Building addition will require excavation within close proximity to existing building foundations and other structures. Without limitation of means and methods of contracts, contractor shall provide a report certified by New Jersey licensed Professional Engineer certifying to methods of foundation and building protection during construction including design of sheet piling as required.

## SECTION 01770 - SELECTIVE DEMOLITION

### 1.4 Job Conditions

- A. Condition of Structures: Owner assumes no responsibility for actual condition of structures to be demolished.
  - 1. Conditions existing at time of inspection for bidding purpose 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 demolition work.
- B. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.
  - 1. Storage or sale of removed items will not be permitted on site.
- C. Protections: Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.
  - 1. Erect temporary covered passageways as required by authorities having jurisdiction.
  - 2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structures to be demolished and adjacent facilities to remain.
  - 3. Protect from damage existing finish work that is to remain in place that becomes exposed during selective demolition operations.
  - 4. Protect floors with suitable coverings when necessary.
  - 5. Construct temporary insulated dust-proof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dust-proof doors and security locks.
  - 6. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
  - 7. Remove protections at completion of work.
  - 8. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to occupied portions of building.
- D. Damages: Promptly repair damages caused to adjacent facilities by selective demolition operations.
- E. Pedestrian/Vehicular Traffic: Conduct selective demolition operations and debris removal as required to ensure minimum interference with roads, streets, walks, and

## SECTION 01770 - SELECTIVE DEMOLITION

other adjacent occupied and used facilities.

1. Do not close, block or otherwise obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- F. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.
- G. Utility Services: Maintain existing utilities indicated to stay in service and protect against damage during selective 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. **WATER SERVICE MUST REMAIN UNINTERRUPTED TO ALL PORTIONS OF THE BUILDING(S) AND SITE.**
  2. Maintain fire protection services during selective demolition operations.
- H. Environmental Controls: Use water sprinkling, temporary enclosures and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
1. Do not use water when it may cause damage or create hazardous or objectionable conditions such as ice, flooding and pollution.
- I. Occupancy: Owner will occupy portions of the building 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 advanced notice to Owner of demolition activities that will affect Owner's normal operations.

### PART 2 - ITEMS TO BE SALVAGED AND RETAINED AS PROPERTY OF THE OWNER

- A. Items to be relocated/reset shall be safely stored by the Contractor until relocation is possible.

### PART 3 – EXECUTION

#### 3.1 Preparation

- A. General: Provide interior and exterior shoring, bracing or support to prevent movement, settlement or collapse of areas to be demolished and adjacent facilities to

## SECTION 01770 - SELECTIVE DEMOLITION

remain.

1. Cease operations and notify Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
2. Cover and protect furniture, equipment and fixtures from spoilage or damage when demolition work is performed in areas where such items have not been removed.
3. Erect and maintain dust-proof partition and closures as required to prevent spread of dust or fumes to occupied portions of the building.
  - a. Provide weatherproof closures for exterior openings resulting from demolition work.
  - b. Where selective demolition occurs immediately adjacent to occupied portions of the building, construct dust-proof partitions of minimum 4-inch studs, 5/8-inch drywall (joints taped) on occupied side, 1/2-inch fire retardant plywood on demolition side. Fill partition cavity with sound deadening insulation.
4. Locate, identify, stub off and disconnect utility services that are not indicated to remain.
  - a. Provide bypass connections as necessary to maintain continuity of service to occupied area of building. Provide minimum of 72 hours advance notice to Owner if shutdown of service is necessary during changeover.

### 3.2 Demolition

- A. General: 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.
  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 local authorities having jurisdiction.
  4. For interior slabs on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions indicated to remain. Use power saw where possible.



## SECTION 01770 - SELECTIVE DEMOLITION

5. Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel or sand, free of trash and debris, stones over 6-inches in diameter, root or other organic material.
- B. If unanticipated mechanical, electrical or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written accurate detail. Pending receipt of directive from Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.
- C. Vermin Control: Employ a certified, licensed exterminator and treat entire area of building demolition and removal as well as entire area of all building additions in accordance with governing health regulations for rodent and insect control.

### 3.3 Salvaged Materials

- A. General: Salvaged Items are those so indicated on Drawings or Schedules, or as listed in this Section. Carefully remove salvaged items; clean and protect until disposition.
  1. Items to be incorporated into new work: Store until required for installation or for required modification or restoration.
  2. Other salvage items: Turn over to Owner and obtain receipt.
- B. Historic artifacts, including cornerstones and their contents, commemorative plaques and tablets, antiques and other articles of historic significance, remain property of Owner. Notify Owner's Representative if such items are encountered and obtain acceptance regarding method of removal and salvage for Owner.
- C. Salvage items damaged during demolition shall be replaced by the Contractor with equivalent new items at no cost to the Owner.

### 3.4 Disposal of Demolished Materials

- A. General: Remove from building site debris, rubbish and other materials resulting from demolition operations. Transport and legally dispose off-site.
  1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws and ordinances concerning removal, handling and protection against exposure or environmental pollution.
  2. Burning of removed materials is not permitted on project site.

### 3.5 Cleanup and Repair

- A. General: Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom

SECTION 01770 - SELECTIVE DEMOLITION

clean.

1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start of operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION 02070

## SECTION 02221 - BUILDING DEMOLITION

### 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. The contractor is responsible for photographic record prior to performing the work. Record shall include but is not limited to 24 photographs and a video of the site.

### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Demolition and removal of buildings and structures in their entirety as shown on the drawings (includes all foundations and below-grade utilities back to existing utility street connections).
  - 2. Demolition and removal of site improvements adjacent to the building or structure to be demolished as shown on the drawings.
  - 3. Abandoning in place all below-grade construction and below grade utilities at structures to be demolished ONLY where specifically noted on the drawings.
  - 4. Disconnecting and capping or sealing and filling pipe with hydro grout at all abandoned utilities per item # 3 above (Confirm with Owner/Architect prior to proceeding).
  - 5. Protect existing structures to remain and provide structural stabilization for adjacent properties and sitework.

### 1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or recycled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner. Exterior stone plaques as noted on drawings.
- C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or recycled.

### 1.4 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during building demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.
  - 1. Coordinate with Owner/Architect, who will establish special procedures for removal and salvage.

### 1.5 SUBMITTALS

- A. Qualification Data: For demolition firm recovery technician.

## SECTION 02221 - BUILDING DEMOLITION

- B. Proposed Environmental-Protection, Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
  - 1. Submit a written report acknowledging a complete understanding of all applicable city ordinances and requirements addressing each item therein.
- C. Schedule of Building Demolition Activities: Indicate the following:
  - 1. Detailed sequence of demolition and removal work, with starting and ending dates for each activity.
  - 2. Interruption of utility services.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Locations of temporary protection for existing building and facilities to remain on site.
  - 5. Coordination of Owner's continuing occupancy of adjacent buildings and partial use of premises.
- D. Inventory: After building demolition is complete, submit a list of items that have been removed and salvaged.
- E. Pre-demolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by building demolition operations. Submit before Work begins.
- F. Landfill Records: Provide a complete report including receipts and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes upon completion of the project.
- 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.

### 1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work of three projects similar in material and extent to that indicated for this Project. Submit project name and contact person with current telephone numbers for reference.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Standards: Comply with ANSI A10.6 and NFPA 241.

## SECTION 02221 - BUILDING DEMOLITION

- E. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Coordination." Review methods and procedures related to building demolition including, but not limited to, the following:
  - 1. Inspect and discuss condition of construction to be demolished.
  - 2. Review structural load limitations of existing structures.
  - 3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review and finalize protection requirements.
  - 5. Provide complete permits and demonstrate that all city ordinances and laws will be adhered to.

### 1.7 PROJECT CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of Work.
- B. Conduct building demolition so Owner's operations will not be disrupted.
  - 1. Provide not less than 24 hours' notice to Owner of activities that will affect Owner's operations.
  - 2. Maintain access to existing walkways, exits, and other adjacent occupied or used facilities.
    - a. Do not close or obstruct walkways, exits, or other occupied or used facilities without written permission from authorities having jurisdiction.
- B. Owner assumes no responsibility for buildings and structures to be demolished.
  - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
  - 2. Before building demolition, Owner will remove the following items:
    - a. Furniture and equipment are to be relocated. The balance of the furniture and equipment left within structure shall be demolished with the building.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. Asbestos will be abated by Owner before start of the Work.
  - 2. If materials suspected of containing asbestos materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Materials Containing Lead: Materials containing lead are present in buildings and structures to be demolished.
- F. Storage or sale of removed items or materials on-site is not permitted.

## SECTION 02221 - BUILDING DEMOLITION

### 1.8 COORDINATION

- A. Arrange demolition schedule so as not to interfere with Owner's operations and ongoing facilities adjacent to demolition site.

## PART 2 – PRODUCTS

### 2.1 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Division 2 Section "Earthwork."

## PART 3 - EXECUTION

### 3.1 DEMOLITION FIRMS

- A. DCA and DEP pre-approved contractor. Conduct similar project and size within five (5) years of the project time.

### 3.2 EXAMINATION

- A. Survey existing conditions and correlate with requirements indicated to determine extent of building demolition required.
- B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are the same as those indicated in Project Record Documents.
- C. Inventory and record the condition of items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to Architect.
- E. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.
- F. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

### 3.3 PREPARATION

- A. Refrigerant: Remove and store refrigerant according to 40 CFR 82 and regulations of authorities having jurisdiction.
- B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.

## SECTION 02221 - BUILDING DEMOLITION

1. Owner will arrange to shut off indicated utilities when requested by Contractor.
  2. Arrange to shut off indicated utilities with utility companies.
  3. If utility services are required to be removed, relocated, or abandoned, before proceeding with building demolition provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
  4. Cut off pipe or conduit a minimum of 24 inches (610 mm) below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
- C. Existing Utilities: Refer to Division 15 and 16 Sections and the drawings for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.
1. Remove refrigerant from air-conditioning equipment before starting demolition.
- D. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished. See drawings for additional requirements.
1. Strengthen or add new supports when required during progress of demolition.
- E. Removed and Salvaged Items: Comply with the following:
1. Clean salvaged items of dirt and demolition debris.
  2. Pack or crate items after cleaning. Identify contents of containers.
  3. Store items in a secure area until delivery to Owner.
  4. Transport items to Owner's storage area designated by Owner.
  5. Protect items from damage during transport and storage.

### 3.4 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations.
- B. Existing Building to Remain: Protect construction indicated to remain against damage and soiling during demolition.
- C. Existing Utilities: Maintain utility services indicated to remain and protect them against damage during demolition operations.
1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
  2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
    - a. Provide at least 24 hours' notice to Owner if shutdown of service is required during changeover.
- D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as

## SECTION 02221 - BUILDING DEMOLITION

indicated. Comply with requirements in Division 1 Section "Temporary Facilities and Controls."

1. Protect existing site improvements, appurtenances, and landscaping to remain.
2. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
3. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
4. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
5. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
6. Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise from occupied portions of adjacent buildings.

### 3.5 DEMOLITION, GENERAL

- A. General: Demolish indicated existing buildings and structures and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
  1. Do not use cutting torches until work area is cleared of flammable materials. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
  2. Maintain adequate ventilation when using cutting torches.
  3. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Engineering Surveys: Perform surveys as the Work progresses to detect hazards that may result from building demolition activities.
- C. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities. Vehicular entrance/exit to be used for debris removal and heavy equipment must be confirmed with the owner and submitted as part of the contractor's staging plan. Coordinate and provide traffic control requirements with the Sea Isle City Police and Fire Departments.
  1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner or building manager and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
  2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.



## SECTION 02221 - BUILDING DEMOLITION

### 3.6 MECHANICAL DEMOLITION

- A. Remove buildings and structures and site improvements intact when permitted by authorities having jurisdiction.
- B. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- C. Remove debris from elevated portions by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
  - 1. Remove structural framing members and lower to ground by method suitable to minimize ground impact or dust generation.
- D. Concrete: Cut concrete full depth at junctures with construction indicated to remain, using power-driven saw, then remove concrete between saw cuts.
- E. Masonry: Cut masonry at junctures with construction indicated to remain, using power-driven saw, then remove masonry between saw cuts.
- F. Concrete Slabs-on-Grade: Where specifically noted on the drawings to be removed, Saw-cut perimeter of area to be demolished at junctures with construction indicated to remain, then break up and remove.
- G. Structural Steel: Dismantle field connections without bending or damaging steel members. Do not use flame-cutting torches unless otherwise authorized by Architect/authorities having jurisdiction.
  - 1. Transport steel trusses and joists as whole units without dismantling them further.
- H. Building Components: Remove metal gratings, metal ladders, doors, windows, door hardware, cabinets, mirrors, chalkboards and marker boards, tackboards, toilet accessories, plumbing fixtures and light fixtures (etc.), as whole units, intact and undamaged.
- I. Elevators: Remove as whole units as much as practical.
- J. Equipment: Disconnect equipment at nearest fitting connection to services, complete with service valves. Remove as whole units, complete with controls.
- K. Below-Grade Construction: Abandon foundation walls and other below-first floor slab construction. Cut walls 4" below-slab construction and provide new concrete flush with slab.
- L. Existing Utilities: Abandon existing utilities and below-grade utility structures. Cut utilities flush with grade.
  - 1. Fill abandoned utility structures with satisfactory soil materials or recycled pulverized concrete according to backfill requirements in Division 2 Section "Earthwork."
  - 2. Piping: Disconnect piping at unions, flanges, valves, or fittings.
  - 3. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

## SECTION 02221 - BUILDING DEMOLITION

### 3.7 EXPLOSIVE DEMOLITION

- A. Explosives: Use of explosives is not permitted.

### 3.8 SITE RESTORATION

- A. Below-Slab Areas: Completely fill below-slab areas and voids resulting from building demolition operations with satisfactory soil materials or recycled pulverized concrete according to backfill requirements in Division 2 Section "Earthwork."
- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

### 3.9 REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by building demolition operations.

### 3.10 RECYCLING DEMOLISHED MATERIALS

- A. General: Separate recyclable demolished materials from other demolished materials to the maximum extent possible. Separate recyclable materials by type.
  - 1. Provide containers or other storage method approved by Architect and local authorities having jurisdiction for controlling recyclable materials until they are removed from Project site.
  - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 3. Stockpile materials away from demolition area. Do not store within drip line of remaining trees.
  - 4. Store components off the ground and protect from the weather.
  - 5. Transport recyclable materials off Owner's property and legally dispose of them.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling building demolition materials shall accrue to Contractor.
- C. Asphalt: Break up and transport asphalt to asphalt recycling facility.
- D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
  - 1. Pulverize masonry to maximum 4-inch (100-mm) size.
  - 2. Clean and stack 100 undamaged whole brick units on wood pallets and store at the adjacent school.
- E. Wood Materials: Sort and stack members according to size, type, and length. Separate dimensional and engineered lumber, panel products, and treated wood materials.
- F. Metals: Separate metals by type.

## SECTION 02221 - BUILDING DEMOLITION

1. Structural Steel: Stack members according to size, type of member, and length.
  2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- G. Roofing: Separate organic and glass-fiber shingles and felts. Remove nails, staples, and accessories.
- H. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- I. Carpet and Pad: Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency.
- J. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs.
- K. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinkler heads, and other components by type and size.
- L. Lighting Fixtures: Separate lamps by type and protect from breakage.
- M. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
- N. Conduit: Reduce conduit to straight lengths and store by type and size.

### 3.11 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.
- D. For demolition disposal, the Contractor shall determine if any of the lead based paint waste generated by the work is regulated as hazardous waste. The Contractor shall utilize the Toxicity Characteristic Leachate Procedure (TCLP) test procedure, Test Method 1311 in "Test Methods for Evaluating Solid" waste, Physical/Chemical Methods, EPA publication SW-846, as incorporated by reference in 40 CFR 260.11 and as referenced in State regulations for painted material in question.

Test results for the TCLP for Lead shall be as per EPA HW#D008, less than 5.0 mg/L or the material treated as hazardous waste. Hazardous waste haulers shall possess a hazardous waste haulers license. Documentation of disposal shall be provided to the Owner prior to approval of final payment.

SECTION 02221 - BUILDING DEMOLITION

NOTE: OSHA monitoring to establish the Permissible Exposure Limit (PEL) for the removal and disposal of components coated with lead based paint shall be the responsibility of the Contractor.

3.12 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

END OF SECTION 02221

## SECTION 02231 - SITE CLEARING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Temporary soil erosion and sedimentation control measures.

#### 1.2 MATERIAL OWNERSHIP

- ##### A.
- Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

#### 1.3 PROJECT CONDITIONS

- ##### A. Traffic:
- Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner.

- ##### B. Salvable Improvements:
- Carefully remove items indicated to be salvaged and store on Owner's premises where directed.

- ##### C. Utility Locator Service:
- Retain the services of a utility locator to locate utility owned and owner owned underground facilities before site clearing.

- ##### D.
- Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

- ##### E.
- The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.

3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 02300 "Earthwork."
  1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
  1. Restore damaged improvements to their original condition, as acceptable to Owner.

### 3.2 TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary soil erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to soil erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

- C. Inspect, maintain, and repair soil erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove soil erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### 3.3 EXISTING UTILITIES

- A. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Owner's written permission.

### 3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  - 1. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
  - 2. Use only hand methods for grubbing within protection zones.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
  - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

### 3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 02231



## SECTION 02300 - EARTHWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Preparing subgrades for walks, pavements, turf and grasses, and plants.
2. Subbase course for asphalt and concrete paving.
3. Excavating and backfilling for utility trenches.

#### 1.2 DEFINITIONS

##### A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

##### B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

##### C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

##### D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

##### E. Fill: Soil materials used to raise existing grades.

##### F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

- G. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- H. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- I. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

### 1.3 QUALITY ASSURANCE

- A. Preexcavation Conference: Conduct conference at Project site.

### 1.4 PROJECT CONDITIONS

- A. Utility Locator Service: Retain the services of a utility locator to locate utility owned and college owned underground facilities before earth moving operations.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
  - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

- E. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain soil erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

#### 3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

#### 3.3 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

#### 3.4 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
  - 1. Clearance: 12 inches each side of pipe or conduit.

- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
  - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.
- D. Trenches in Tree- and Plant-Protection Zones:
  - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
  - 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

### 3.5 SUBGRADE INSPECTION

- A. Proof-roll subgrade below pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

### 3.6 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Engineer.
  - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Engineer.

### 3.7 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.8 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
  1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- D. Place and compact final backfill of satisfactory soil to final subgrade elevation.

### 3.9 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  1. Under grass and planted areas, use satisfactory soil material.
  2. Under walks and pavements, use satisfactory soil material.

### 3.10 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

### 3.11 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D D 1557:
  - 1. Under pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
  - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
  - 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
  - 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

### 3.12 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
  - 2. Walks: Plus or minus 1 inch.
  - 3. Pavements: Plus or minus 1/2 inch.

### 3.13 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course under pavements and walks as follows:
  - 1. Shape subbase course to required crown elevations and cross-slope grades.
  - 2. Place subbase course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.

3. Compact subbase course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

#### 3.14 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

#### 3.15 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

#### 3.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 02300





## SECTION 02350 - CAST-IN-PLACE CONCRETE FOR SITEWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes cast-in-place concrete for curbs sidewalks and pavement, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.
- D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
  2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- E. Preinstallation Conference: Conduct conference at Project site.

## PART 2 - PRODUCTS

### 2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

### 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
1. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class I or Class II zinc coated after fabrication and bending.
  2. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M, epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm) bar length.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- D. Galvanized-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from galvanized-steel wire into flat sheets.
- E. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, plain or deformed steel.
- F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

## 2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
- B. Comply with Section 903 – Concrete of the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction as amended to date.
  - 1. Portland Cement: ASTM C 150, Type I, Type II and Type III [Type V], gray.
  - 2. Retain supplementary cementing materials from first two subparagraphs below if permitted. Ready-mix concrete manufacturer blends these materials with portland cement. Fly ash, slag, or pozzolanic materials may slow rate of concrete strengthening and affect color uniformity. Availability of Class F fly ash predominates over Class C fly ash.
    - a. Fly Ash: ASTM C 618, Class F or C.
    - b. Ground Granulated Blast-Furnace Slag: ASTM M 302, Grade 120.
  - 3. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag, Type IP, portland-pozzolan, Type I (PM), pozzolan-modified Portland or Type I (SM), slag-modified portland cement.
- C. Normal-Weight Aggregates: ASTM C 33, graded.
  - 1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Water: ASTM C 94/C 94M and potable.

## 2.4 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 2.5 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A, B or C. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- B. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick.

## 2.6 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating.
- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
  - 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
  - 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

## 2.8 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
- D. Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 4500 psi (31 MPa) at 28 days.
  - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
  - 3. Slump Limit: 4 inches (100 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch (25 mm).
  - 4. Air Content: 6.0 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.

## 2.9 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## 2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer and/or round exterior corners and edges of permanently exposed concrete.

### 3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

### 3.3 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

### 3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

### 3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
- E. Waterstops: Install in construction joints and at other joints indicated according to manufacturer's written instructions.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- C. Cold-Weather Placement: Comply with ACI 306.1.
- D. Hot-Weather Placement: Comply with ACI 301.

### 3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.

- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
  - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
  - 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
  - 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.



1. Apply float finish to surfaces to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighthen until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces exposed to view.
  2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch (4.8 mm).
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

### 3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
  2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
- 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.10 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

### 3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 03350

## SECTION 02510 - FACILITY WATER DISTRIBUTION PIPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for combined water service and fire-service mains.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
  - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
  - 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Comply with ASTM F 714 for selection, design, and installation of thermoplastic water piping.

- D. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- F. NSF Compliance:
  - 1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
  - 2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

## 1.6 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution 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 water-distribution service according to requirements indicated:
  - 1. Do not proceed with interruption of water-distribution service without Owner's written permission.

## 1.7 COORDINATION

- A. Coordinate connection to water main with utility company.

## PART 2 - PRODUCTS

### 2.1 PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
  - 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
  - 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
  - 1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

2. Gaskets: AWWA C111, rubber.
- C. PE, Fire-Service Pipe: ASTM F 714, AWWA C906, or equivalent for PE water pipe; FMG approved, with minimum thickness equivalent to FMG Class 200.
  1. Molded PE Fittings: ASTM D 3350, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.
- D. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket, and with spigot end.
  1. Comply with UL 1285 for fire-service mains if indicated.
  2. PVC Fabricated Fittings: AWWA C900, [**Class 150**] [**and**] [**Class 200**], with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
  3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
  4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
    - a. Gaskets: AWWA C111, rubber.
  5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
    - a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

## 2.2 JOINING MATERIALS

- A. Refer to Section 02645 "Common Work Results for Utilities" for commonly used joining materials.

## 2.3 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- B. Tubular-Sleeve Pipe Couplings:
  1. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
    - a. Standard: AWWA C219.

## 2.4 GATE VALVES

### A. AWWA, Cast-Iron Gate Valves:

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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. American Cast Iron Pipe Co.; American Flow Control Div.
  - b. Mueller Co.; Water Products Div.
  - c. U.S. Pipe and Foundry Company.
4. Nonrising-Stem, Metal-Seated Gate Valves:
  - a. Description: Gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.
    - 1) Standard: AWWA C500.
    - 2) Minimum Pressure Rating: 200 psig (1380 kPa).
    - 3) End Connections: Mechanical joint.
    - 4) Interior Coating: Complying with AWWA C550.
5. Nonrising-Stem, Resilient-Seated Gate Valves:
  - a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
    - 1) Standard: AWWA C509.
    - 2) Minimum Pressure Rating: 200 psig (1380 kPa).
    - 3) End Connections: Mechanical joint.
    - 4) Interior Coating: Complying with AWWA C550.
6. Nonrising-Stem, High-Pressure, Resilient-Seated Gate Valves:
  - a. Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.
    - 1) Standard: AWWA C509.
    - 2) Minimum Pressure Rating: 250 psig (1725 kPa).
    - 3) End Connections: Push on or mechanical joint.
    - 4) Interior Coating: Complying with AWWA C550.
7. OS&Y, Rising-Stem, Metal-Seated Gate Valves:

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- a. Description: Cast- or ductile-iron body and bonnet, with cast-iron double disc, bronze disc and seat rings, and bronze stem.
  - 1) Standard: AWWA C500.
  - 2) Minimum Pressure Rating: 200 psig (1380 kPa).
  - 3) End Connections: Flanged.
8. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:
  - a. Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.
    - 1) Standard: AWWA C509.
    - 2) Minimum Pressure Rating: 200 psig (1380 kPa).
    - 3) End Connections: Flanged.
- B. UL/FMG, Cast-Iron Gate Valves:
  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:
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  3. Basis-of-Design Product: Subject to compliance with requirements, provide [the product indicated on Drawings or a comparable product by one of the following:
    - a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
    - b. Mueller Co.; Water Products Div.
  4. UL/FMG, Nonrising-Stem Gate Valves:
    - a. Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.
      - 1) Standards: UL 262 and FMG approved.
      - 2) Minimum Pressure Rating: 175 psig (1207 kPa).
      - 3) End Connections: Flanged.
  5. OS&Y, Rising-Stem Gate Valves:
    - a. Description: Iron body and bonnet and bronze seating material.
      - 1) Standards: UL 262 and FMG approved.
      - 2) Minimum Pressure Rating: 175 psig (1207 kPa).
      - 3) End Connections: Flanged.

## 2.5 GATE VALVE ACCESSORIES AND SPECIALTIES

### A. Tapping-Sleeve Assemblies:

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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide [the product indicated on Drawings or a comparable product by one of the following:
  - a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
  - b. Mueller Co.; Water Products Div.
  - c. U.S. Pipe and Foundry Company.
4. Description: Sleeve and valve compatible with drilling machine.
  - a. Standard: MSS SP-60.
  - b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
  - c. Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

### B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches (125 mm) in diameter.

1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

### C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

## 2.6 CORPORATION VALVES AND CURB VALVES

### A. Manufacturers:

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:



2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
  - b. Mueller Co.; Water Products Div.
  - c. U.S. Pipe and Foundry Company.
  
- B. Service-Saddle Assemblies: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.
  1. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
  2. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.
  3. Manifold: Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.
  
- C. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.
  
- D. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches (75 mm) in diameter.
  1. Shutoff Rods: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

## 2.7 CONCRETE VAULTS

- A. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.
  1. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.
  2. Manhole: ASTM A 48/A 48M Class No. 35A minimum tensile strength, gray-iron traffic frame and cover.
    - a. Dimension: not less than 30-inch (760-mm) minimum dimension, unless otherwise indicated.
  3. Manhole: ASTM A 536, Grade 60-40-18, ductile-iron traffic frame and cover.
    - a. Dimension: not less than 30-inch- (760-mm-) minimum dimension, unless otherwise indicated.

4. Drain: ASME A112.6.3, cast-iron floor drain with outlet of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed bronze ball or clapper-type backwater valve.

### PART 3 - EXECUTION

#### 3.1 EARTHWORK

- A. Refer to Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

#### 3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Water Meter Box Water-Service Piping shall be same as underground water-service piping.
- F. Underground Fire-Service-Main Piping shall be the following:
  1. Ductile-iron, mechanical-joint pipe; ductile-iron, mechanical-joint fittings; joints.
  2. PE, Class 200, fire-service pipe; molded PE fittings; and heat-fusion joints.
  3. PVC, AWWA Class 150 pipe listed for fire-protection service; PVC Class 150 fabricated or molded fittings; and gasketed joints.
  4. PVC, AWWA Class 200 pipe listed for fire-protection service; PVC Class 200 fabricated fittings; and gasketed joints.
- G. Underground Combined Water-Service and Fire-Service-Main Piping shall be the following:
  1. Ductile-iron, gasketed mechanical-joint pipe; ductile-iron, mechanical-joint fittings; ductile-iron-pipe appurtenances.

### 3.3 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  - 1. Underground Valves, NPS 3 (DN 80) and Larger: AWWA, cast-iron, nonrising-stem, resilient-seated gate valves with valve box.

### 3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. See Section 330500 "Common Work Results for Utilities" for piping-system common requirements.

### 3.5 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- C. Make connections larger than NPS 2 (DN 50) with tapping machine according to the following:
  - 1. Install tapping sleeve and tapping valve according to MSS SP-60.
  - 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
  - 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
  - 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- D. Comply with NFPA 24 for fire-service-main piping materials and installation.
- E. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
- F. Install PE pipe according to ASTM D 2774 and ASTM F 645.
- G. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- H. Bury piping with depth of cover over top at least 48 inches.

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- I. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
  - 1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- J. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

### 3.6 JOINT CONSTRUCTION

- A. See Section 330500 "Common Work Results for Utilities" for basic piping joint construction.
- B. Make pipe joints according to the following:
  - 1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
  - 2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
  - 3. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
  - 4. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
  - 5. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
  - 6. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure.

### 3.7 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
  - 1. Concrete thrust blocks.
  - 2. Locking mechanical joints.
  - 3. Set-screw mechanical retainer glands.
  - 4. Bolted flanged joints.
  - 5. Heat-fused joints.
  - 6. Pipe clamps and tie rods.

- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
  - 1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
  - 2. Fire-Service-Main Piping: According to NFPA 24.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

### 3.8 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- C. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

### 3.9 WATER METER INSTALLATION

- A. Install water meters, piping, and specialties according to utility company's written instructions.
- B. Water Meters: Install displacement-type water meters, NPS 2 (DN 50) and smaller, in meter boxes with shutoff valves on water meter inlets. Include valves on water meter outlets and valved bypass around meters unless prohibited by authorities having jurisdiction.
- C. Water Meters: Install compound-type water meters, NPS 3 (DN 80) and larger, in meter vaults. Include shutoff valves on water meter inlets and outlets and valved bypass around meters. Support meters, valves, and piping on brick or concrete piers.

### 3.10 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
- C. Do not install bypass piping around backflow preventers.

- D. Support NPS 2-1/2 (DN 65) and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

### 3.11 WATER METER BOX INSTALLATION

- A. Install water meter boxes in grass or earth areas with top 2 inches above surface.

### 3.12 CONCRETE VAULT INSTALLATION

- A. Install precast concrete vaults according to ASTM C 891.

### 3.13 CONNECTIONS

- A. See Section 330500 "Common Work Results for Utilities" for piping connections to valves and equipment.
- B. Connect water-distribution piping to utility water main. Use tapping sleeve and tapping valve.

### 3.14 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
  - 1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

### 3.15 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."

### 3.16 CLEANING

#### A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
  - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
  - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
  - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
  - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

#### B. Prepare reports of purging and disinfecting activities.

END OF SECTION 02510





## SECTION 02530 - FACILITY SANITARY SEWERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Pipe and fittings.
2. Nonpressure and pressure couplings.
3. Expansion joints.
4. Cleanouts.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For expansion joints.
- B. Shop Drawings: For connection to existing digester tank. Include plans, elevations, sections, details.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
- B. Product Certificates: For each type of pipe and fitting, from manufacturer.
- C. Field quality-control reports.

### PART 2 - PRODUCTS

#### 2.1 PVC PIPE AND FITTINGS

##### A. PVC Type PSM Sewer Piping:

1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

## 2.2 NONPRESSURE-TYPE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
  - 1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
  - 2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Unshielded, Flexible Couplings:
  - 1. Description: Elastomeric sleeve with corrosion-resistant-metal tension band and tightening mechanism on each end.
- D. Ring-Type, Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

## 2.3 CLEANOUTS

- A. Cast-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
  - 1. Top-Loading Classification(s): Heavy Duty.
  - 2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 02300 "Earth Moving."

### 3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

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- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure, drainage piping according to the following:
  - 1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
  - 2. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.
- G. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

### 3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
  - 1. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
  - 2. Join dissimilar pipe materials with nonpressure-type, flexible couplings.
- B. Pipe couplings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
  - 1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
    - a. Unshielded flexible couplings for pipes of same or slightly different OD.
    - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
    - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

### 3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
  - 1. Use Heavy-Duty, top-loading classification cleanouts in all areas.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 12 by 12 by 8 inches deep. Set with tops flush with surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

### 3.5 CONNECTIONS

- A. Make connections to existing piping and underground manholes.
  - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch (150-mm) overlap with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
  - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20 (DN 100 to DN 500). Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
  - 3. Make branch connections from side into existing piping, NPS 21 (DN 525) or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches (76 mm) of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches (150 mm) of concrete for minimum length of 12 inches (300 mm) to provide additional support of collar from connection to undisturbed ground.
    - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi (20.7 MPa) unless otherwise indicated.
    - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
  - 4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

### 3.6 IDENTIFICATION

- A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
  - 1. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

### 3.7 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (600 mm) of backfill is in place, and again at completion of Project.
  - 1. Submit separate report for each system inspection.
  - 2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.
  - 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
  - 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
  - 1. Do not enclose, cover, or put into service before inspection and approval.
  - 2. Test completed piping systems according to requirements of authorities having jurisdiction.
  - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
  - 4. Submit separate report for each test.
  - 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
    - a. Fill sewer piping with water. Test with pressure of at least 10-foot (3-m) head of water, and maintain such pressure without leakage for at least 15 minutes.
    - b. Close openings in system and fill with water.
    - c. Purge air and refill with water.
    - d. Disconnect water supply.

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- e. Test and inspect joints for leaks.
  - 6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
    - a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
    - b. Option: Test concrete gravity sewer piping according to ASTM C 924 (ASTM C 924M).
  - 7. Manholes: Perform hydraulic test according to ASTM C 969 (ASTM C 969M).
  - C. Leaks and loss in test pressure constitute defects that must be repaired.
  - D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.
- 3.8 CLEANING
- A. Clean dirt and superfluous material from interior of piping.

END OF SECTION 02530

## SECTION 02630 - FACILITY STORM DRAINAGE PIPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.

B. Related Section:

1. Section 02640 "Storm Utility Drainage Piping" for storm drainage piping outside the building.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

#### 1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

### 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.

## 2.2 PVC PIPE AND FITTINGS

- A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
- B. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.
- C. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- D. Adhesive Primer: ASTM F 656.
  - 1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Solvent Cement: ASTM D 2564.
  - 1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.3 SPECIALTY PIPE FITTINGS

- A. Transition Couplings:
  - 1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
  - 2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified-piping-system fitting.
  - 3. Unshielded, Nonpressure Transition Couplings:
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Dallas Specialty & Mfg. Co.
      - 2) Fernco Inc.
      - 3) Mission Rubber Company; a division of MCP Industries, Inc.
      - 4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.



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- b. Standard: ASTM C 1173.
  - c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
  - d. Sleeve Materials:
    - 1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
    - 2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
    - 3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
4. Shielded, Nonpressure Transition Couplings:
- a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) Cascade Waterworks Mfg. Co.
    - 2) Mission Rubber Company; a division of MCP Industries, Inc.
  - b. Standard: ASTM C 1460.
  - c. 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 Section 02300 "Earth Moving."

### 3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from 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 at indicated slopes.
- E. Install fittings for changes in direction and branch connections.
- F. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- G. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- H. Install storm drainage piping at the following minimum slopes unless otherwise indicated:
  - 1. Building Storm Drain: 2 percent downward in direction of flow for piping NPS 4 (DN 100) and smaller; 1 percent downward in direction of flow for piping NPS 6 (DN 150) and larger.
- I. Install underground ABS and PVC piping according to ASTM D 2321.
- J. Plumbing Specialties:
  - 1. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping.
  - 2. Install drains in storm drainage gravity-flow piping.
- K. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

### 3.3 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasketed 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. 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.
- D. Plastic, Nonpressure-Piping, Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

### 3.4 SPECIALTY PIPE FITTING INSTALLATION

#### A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Unshielded, nonpressure transition couplings.

### 3.5 CONNECTIONS

#### A. Drawings indicate general arrangement of piping, fittings, and specialties.

#### B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

#### C. Connect storm drainage piping to roof drains and storm drainage specialties.

1. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.

#### D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

### 3.6 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.
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 storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

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1. 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 separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

### 3.7 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains 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.

### 3.8 PIPING SCHEDULE

- A. Underground storm drainage piping NPS 6 (DN 150 and smaller shall be any of the following:
  1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
  2. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.
- B. Underground, storm drainage piping NPS 8 (DN 200) and larger shall be the following:
  1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
  2. Cellular-core, sewer and drain series, PVC pipe; PVC socket fittings; and solvent-cemented joints.

END OF SECTION 02630

## SECTION 02635 - STORM DRAINAGE PIPING SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Miscellaneous storm drainage piping specialties.
  - 2. Cleanouts.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.3 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

### PART 2 - PRODUCTS

#### 2.1 CLEANOUTS

- A. Floor Cleanouts:
  - 1. Standard: ASME A112.36.2M, for cast-iron soil pipe with cast-iron ferrule cleanouts.
  - 2. Size: Same as connected branch.
  - 3. Type: Cast-iron soil pipe with cast-iron ferrule.
  - 4. Body or Ferrule Material: Cast iron.
  - 5. Clamping Device: Not required.
  - 6. Closure: Cast-iron plug.
  - 7. Adjustable Housing Material: Cast iron with set-screws or other device.
  - 8. Frame and Cover Shape: Round.
  - 9. Top-Loading Classification: Heavy Duty.
  - 10. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install downspout boots at grade with top 12 inches (305 mm) above grade. Secure to building wall.
- B. Install conductor nozzles at exposed bottom of conductors where they spill onto grade.
- C. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:
  - 1. Use cleanouts the same size as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
  - 2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
  - 3. Locate cleanouts at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
  - 4. Locate cleanouts at base of each vertical soil and waste stack.
- D. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- E. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

#### 3.2 CONNECTIONS

- A. Comply with requirements for piping specified in Section 02630 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

#### 3.3 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 02635

## SECTION 02640 - STORM UTILITY DRAINAGE PIPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Pipe and fittings.
2. Channel drainage systems.
3. Encasement for piping.
4. Manholes.
5. Cleanouts.
6. Nonpressure transition couplings.
7. Expansion joints.
8. Catch basins.
9. Stormwater inlets.
10. Pipe outlets.

#### 1.2 ACTION SUBMITTALS

##### A. Product Data: For each type of product indicated.

##### B. Shop Drawings:

1. Manholes: Include plans, elevations, sections, details, frames, and covers.
2. Catch basins and stormwater inlets. Include plans, elevations, sections, details, frames, covers, and grates.

#### 1.3 INFORMATIONAL SUBMITTALS

##### A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

##### B. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.

##### C. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.

- D. Field quality-control reports.

#### 1.4 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage 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 service.
  - 2. Do not proceed with interruption of service without Owner's written permission.

### PART 2 - PRODUCTS

#### 2.1 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

#### 2.2 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Heavy-Duty, Shielded Couplings:
  - 1. Description: ASTM C 1277 and ASTM C 1540, with stainless-steel shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

#### 2.3 DUCTILE-IRON, CULVERT PIPE AND FITTINGS

- A. Pipe: ASTM A 716, for push-on joints.
- B. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.
- C. Compact Fittings: AWWA C153, for push-on joints.
- D. Gaskets: AWWA C111, rubber.



## 2.4 PE PIPE AND FITTINGS

- A. Corrugated PE Drainage Pipe and Fittings NPS 3 to NPS 10: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
  - 1. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
  - 2. Soiltight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.
- B. Corrugated PE Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
  - 1. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
  - 2. Soiltight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings.

## 2.5 PVC PIPE AND FITTINGS

- A. PVC Corrugated Sewer Piping:
  - 1. Pipe: ASTM F 949, PVC, corrugated pipe with bell-and-spigot ends for gasketed joints.
  - 2. Fittings: ASTM F 949, PVC molded or fabricated, socket type.
  - 3. Gaskets: ASTM F 477, elastomeric seals.

## 2.6 CONCRETE PIPE AND FITTINGS

- A. Nonreinforced-Concrete Sewer Pipe and Fittings: ASTM C 14, Class 3, with bell-and-spigot or tongue-and-groove ends and gasketed joints with ASTM C 443, rubber gaskets.
- B. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76.
  - 1. Bell-and-spigot or tongue-and-groove ends and gasketed joints with ASTM C 443, rubber gaskets.
  - 2. Class III, IV or V, Wall B.

## 2.7 NONPRESSURE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Concrete Pipes: ASTM C 443, rubber.
2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
4. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Shielded, Flexible Couplings:

1. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

E. Ring-Type, Flexible Couplings:

1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

## 2.8 EXPANSION JOINTS

A. Ductile-Iron Flexible Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings or comparable product by one of the following:
  - a. EBA Iron Sales, Inc.
  - b. Romac Industries, Inc.
  - c. Star Pipe Products.
3. Description: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections, rated for 250-psig minimum working pressure and for offset and expansion indicated.

## 2.9 CLEANOUTS

### A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Top-Loading Classification(s): Heavy Duty and Extra-Heavy Duty.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

### B. Plastic Cleanouts:

1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

## 2.10 ENCASUREMENT FOR PIPING

- A. Standard: ASTM A 674 or AWWA C105.
- B. Material: Linear low-density polyethylene film of 0.008-inch or high-density, cross-laminated polyethylene film of 0.004-inch minimum thickness.
- C. Form: Sheet or tube.
- D. Color: Black or natural.

## 2.11 MANHOLES

### A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 5-inch minimum thickness, and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.

8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches .
10. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 30-inch ID by 7- to 9-inch riser with 4-inch- minimum width flange. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.

2.12 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
  - a. Invert Slope: 1 percent through manhole.

2. Benches: Concrete, sloped to drain into channel.

a. Slope: 4 percent.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.

2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

### 2.13 POLYMER-CONCRETE, CHANNEL DRAINAGE SYSTEMS

A. General Requirements for Polymer-Concrete, Channel Drainage Systems: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include quantity of units required to form total lengths indicated.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings or comparable product by one of the following:

1. ABT, Inc.

2. ACO USA.

3. Innovative Plastic, Inc.; a subsidiary of T-H Marine Supplies, Inc.

4. Mea-Josam Div.; Josam Company.

5. Poly-Cast.

D. Sloped-Invert, Polymer-Concrete Systems:

1. Channel Sections:

a. Interlocking-joint, precast, modular units with end caps.

b. 4-inch inside width and deep, rounded bottom, with built-in invert slope of 0.6 percent and with outlets in quantities, sizes, and locations indicated.

c. Extension sections necessary for required depth.

d. Frame: Include gray-iron or steel frame for grate.

2. Grates:

a. Manufacturer's designation "Heavy Duty," with slots or perforations that fit recesses in channels.

b. Material: Gray iron.

3. Covers: Solid gray iron if indicated.
  4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- E. Narrow-Width, Level-Invert, Polymer-Concrete Systems:
1. Channel Sections:
    - a. Interlocking-joint, precast, modular units with end caps.
    - b. 5-inch inside width and 9-3/4-inch- deep, rounded bottom, with level invert and with NPS 4 outlets in quantities, sizes, and locations indicated.
  2. Grates:
    - a. Slots or perforations that fit recesses in channels.
    - b. Material: Gray iron.
  3. Covers: Solid gray iron if indicated.
  4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- F. Wide-Width, Level-Invert, Polymer-Concrete Systems:
1. Channel Sections:
    - a. Interlocking-joint, precast, modular units with end caps.
    - b. 8-inch inside width and 13-3/4-inch- deep, rounded bottom, with level invert and with outlets in quantities, sizes, and locations indicated.
  2. Grates:
    - a. Slots or other openings that fit recesses in channels.
    - b. Material: Gray iron.
  3. Covers: Solid gray iron if indicated.
  4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- G. Drainage Specialties: Precast, polymer-concrete units.
1. Large Catch Basins:
    - a. 24-by-12-inch polymer-concrete body, with outlets in quantities and sizes indicated.
    - b. Gray-iron slotted grate.
    - c. Frame: Include gray-iron or steel frame for grate.

2. Small Catch Basins:

- a. 19- to 24-inch by approximately 6-inch polymer-concrete body, with outlets in quantities and sizes indicated.
- b. Gray-iron slotted grate.
- c. Frame: Include gray-iron or steel frame for grate.

3. Oil Interceptors:

- a. Polymer-concrete body with interior baffle and four steel support channels and two 1/4-inch- thick, steel-plate covers.
- b. Steel-plate covers.
- c. Capacity: 140 gal.
- d. Inlet and Outlet: NPS 4.

4. Sediment Interceptors:

- a. 27-inch- square, polymer-concrete body, with outlets in quantities and sizes indicated.
- b. 24-inch- square, gray-iron frame and slotted grate.

H. Supports, Anchors, and Setting Devices: Manufacturer's standard unless otherwise indicated.

I. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.

2.14 CATCH BASINS

A. Standard Precast Concrete Catch Basins:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Base Section: 6-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
3. Riser Sections: 5-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
5. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
6. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch- diameter frame and grate.

8. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 48 inches.
  9. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
- B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.
1. Size: 24 by 24 inches minimum unless otherwise indicated.
  2. Grate Free Area: Approximately 50 percent unless otherwise indicated.
- C. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch- diameter flat grate with small square or short-slotted drainage openings.
1. Grate Free Area: Approximately 50 percent unless otherwise indicated.

## 2.15 STORMWATER INLETS

- A. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to utility standards.
- B. Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.
- C. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.
- D. Frames and Grates: Heavy duty.

## 2.16 PIPE OUTLETS

- A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.
- B. Riprap Basins: Broken, irregularly sized and shaped, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."
1. Average Size: NSSGA No. R-3, screen opening 2 inches.
  2. Average Size: NSSGA No. R-4, screen opening 3 inches.
  3. Average Size: NSSGA No. R-5, screen opening 5 inches.



- C. Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size graded stone.
- D. Energy Dissipaters: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. A-1, 3-ton average weight armor stone, unless otherwise indicated.

### PART 3 - EXECUTION

#### 3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 02300 "Earth Moving."

#### 3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
  - 1. Install piping pitched down in direction of flow.
  - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
  - 3. Install piping with 36-inch minimum cover.

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4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
  5. Install hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
  6. Install ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
  7. Install PE corrugated sewer piping according to ASTM D 2321.
  8. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
  9. Install nonreinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
  10. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
- G. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:
1. Hub-and-spigot, cast-iron soil pipe and fittings.
  2. Hubless cast-iron soil pipe and fittings.
  3. Ductile-iron pipe and fittings.
  4. Expansion joints.

### 3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following:
1. Join hub-and-spigot, cast-iron soil piping with gasketed joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
  2. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
  3. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
  4. Join ductile-iron culvert piping according to AWWA C600 for push-on joints.
  5. Join ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
  6. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
  7. Join PVC corrugated sewer piping according to ASTM D 2321 for elastomeric-seal joints.
  8. Join nonreinforced-concrete sewer piping according to ASTM C 14 (ASTM C 14M) and ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
  9. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
  10. Join dissimilar pipe materials with nonpressure-type flexible couplings.

### 3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
  - 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
  - 2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
  - 3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
  - 4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 8 inches deep. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

### 3.5 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 1 inches above finished surface elsewhere unless otherwise indicated.

### 3.6 CATCH BASIN INSTALLATION

- A. Set frames and grates to elevations indicated.

### 3.7 STORMWATER INLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of broken stone, as indicated.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.

- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipaters at outlets, as indicated.

### 3.8 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

### 3.9 CHANNEL DRAINAGE SYSTEM INSTALLATION

- A. Install with top surfaces of components, except piping, flush with finished surface.
- B. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.
- C. Embed channel sections and drainage specialties in 4-inch minimum concrete around bottom and sides.
- D. Fasten grates to channel sections if indicated.
- E. Assemble channel sections with flanged or interlocking joints.
- F. Embed channel sections in 4-inch minimum concrete around bottom and sides.

### 3.10 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Section 02630 "Facility Storm Drainage Piping."
- B. Make connections to existing piping and underground manholes.
  - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
  - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
  - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to

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conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

- a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
  - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- C. Connect to sediment interceptors specified in Section 02530 "Sanitary Waste Interceptors."
- D. Pipe couplings and expansion joints with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
    - a. Unshielded flexible couplings for same or minor difference OD pipes.
    - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
    - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

### 3.11 IDENTIFICATION

- A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
1. Use detectable warning tape over ferrous piping.
  2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

### 3.12 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

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1. Submit separate reports for each system inspection.
  2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.
  3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
  4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
  2. Test completed piping systems according to requirements of authorities having jurisdiction.
  3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
  4. Submit separate report for each test.
  5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
    - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
    - b. Option: Test plastic piping according to ASTM F 1417.
    - c. Option: Test concrete piping according to ASTM C 924.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 02640

## SECTION 02645 - COMMON WORK RESULTS FOR UTILITIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. This Section includes the following:

1. Piping joining materials.
2. Sleeves.
3. Grout.
4. Piping system common requirements.
5. Equipment installation common requirements.
6. Concrete bases.
7. Metal supports and anchorages.

#### 1.2 DEFINITIONS

- A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
- B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

#### 1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Dielectric fittings.
2. Identification devices.

#### 1.4 QUALITY ASSURANCE

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
- B. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

## PART 2 - PRODUCTS

### 2.1 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
  - 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3.2-mm) maximum thickness, unless otherwise indicated.
    - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
  - 2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solvent Cements for Joining Plastic Piping:
  - 1. ABS Piping: ASTM D 2235.
  - 2. CPVC Piping: ASTM F 493.
  - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  - 4. PVC to ABS Piping Transition: ASTM D 3138.

### 2.2 SLEEVES

- A. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- B. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
- C. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.
- D. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

### 2.3 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.



1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

### 3.1 PIPING INSTALLATION

- A. Install piping according to the following requirements and utilities Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.
- 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 to permit valve servicing.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Sleeves are not required for core-drilled holes.
- J. Permanent sleeves are not required for holes formed by removable PE sleeves.
- K. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
  1. Cut sleeves to length for mounting flush with both surfaces.
    - a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas 2 inches (50 mm) above finished floor level.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
  - a. PVC Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
  - b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating gypsum-board partitions.

L. Verify final equipment locations for roughing-in.

M. Refer to equipment specifications in other Sections for roughing-in requirements.

### 3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and utilities Sections specifying piping systems.

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 pipe 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 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. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

F. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

G. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Nonpressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

H. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

I. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

J. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End PE Pipe and Fittings: Use butt fusion.
2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.

### 3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Install dielectric fittings at connections of dissimilar metal pipes.

### 3.4 EQUIPMENT INSTALLATION

A. Install equipment level and plumb, unless otherwise indicated.

B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.

C. Install equipment to allow right of way to piping systems installed at required slope.

### 3.5 IDENTIFICATION

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.

2. Locate pipe markers on exposed piping according to the following:
  - a. Near each valve and control device.
  - b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
  - c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
  - d. At manholes and similar access points that permit view of concealed piping.
  - e. Near major equipment items and other points of origination and termination.

- B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.

1. Lettering Size: Minimum 1/4 inch (6.4 mm) high for name of unit if viewing distance is less than 24 inches (610 mm), 1/2 inch (13 mm) high for distances up to 72 inches (1800 mm), and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
2. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

- C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

### 3.6 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Section 03350 "Cast-in-Place Concrete for Sitework."

### 3.7 GROUTING

- A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 02645



## SECTION 02700 - ASPHALT PAVING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Hot-mix asphalt patching.
2. Hot-mix asphalt paving and permeable asphalt paving.

B. Related Sections:

1. Section 02300 "Earthwork" for aggregate subbase course.
2. New Jersey Department of Transportation (NJDOT) Standard Specifications Division 400 Section 401 "Hot-Mix Asphalt (HMA) Courses" for HMA surface and base courses.
3. New Jersey Stormwater Best Management Practices Manual, Chapter 9.6 "Pervious Pavement Systems" for Permeable Asphalt.

#### 1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

B. Material Certificates: For each paving material, from manufacturer.

#### 1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by NJDOT.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of NJDOT for asphalt paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

- C. Preinstallation Conference: Conduct conference at Project site.

#### 1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
  - 1. Tack Coat: Minimum surface temperature of 60 deg F.
  - 2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
- B. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F, and not exceeding 95 deg F.

### PART 2 - PRODUCTS

#### 2.1 AGGREGATES

- A. Coarse Aggregate: In accordance with NJDOT Standard Specification Section 901.05.01, use coarse aggregate for Hot Mix Asphalt (HMA) that is broken stone conforming to NJDOT Standard Specification Section 901.03.01. In accordance with NJDOT Standard Specification Section 901.05.01, use coarse aggregate for Open Graded Friction Course that is broken stone conforming to NJDOT Standard Specification Section 901.03.01.
- B. Fine Aggregate: In accordance with NJDOT Standard Specification Section 901.05.02, for HMA surface course and Open Graded Friction Course, use fine aggregate that is manufactured stone sand or natural sand.

Manufacture stone sand from aggregates conforming to NJDOT Standard Specification Section 901.03, with not more than 15 percent passing the No. 200 sieve. When the percent passing the No. 200 sieve exceeds 15 percent, blend the stone sand with another approved sand so that the combination contains no more than 15 percent passing the No. 200 sieve, based on stockpile samples theoretically combined. Feed each sand source into the plant through a separate cold feed hopper.

Use natural sand consisting of material composed of predominantly angular particles of quartz or other hard durable minerals conforming to the quality and gradation requirements specified in NJDOT Standard Specification Section Table 901.05.02-1 and Table 901.05.02-2, respectively.



- C. Mineral Filler: In accordance with NJDOT Standard Specification Section 901.05.03, use mineral filler for HMA that is free from lumps and foreign materials. Produce mineral filler from broken stone conforming to NJDOT Standard Specification Section 901.03.01, fly ash conforming to NJDOT Standard Specification Section 903.02.03.A, kiln dust from cement manufacture, or baghouse fines from an HMA plant. Produce baghouse fines from a consistent geological source of coarse and fine aggregate.

Ensure that a HMA mixture containing the filler retains 70 percent of its initial strength after an immersion cycle of 14 days when prepared according to AASHTO T 167 and tested according to AASHTO T 165.

Use mineral filler that, when tested according to AASHTO T 37, conforms to the gradation requirements specified in NJDOT Standard Specification Section Table 901.05.03-1.

## 2.2 ASPHALT MATERIALS

- A. Asphalt Binder: In accordance with NJDOT Standard Specification Section 902.01.01, use asphalt binder that conforms to AASHTO M 320, Table 1. Use Grade 64-22, except the ME may direct that an asphalt of softer grade be used when the mixture contains a high percentage of RAP and except where otherwise specified.
- B. Tack Coat: In accordance with NJDOT Standard Specification Section 902.01.02 and 902.01.03, use cutback asphalt of the rapid-curing types conforming to AASHTO M 81 and cutback asphalt of the medium-curing types conforming to AASHTO M 82 or emulsified asphalts of the rapid-setting (RS), medium-setting (MS), and slow-setting (SS) types conforming to AASHTO M 140. Use cationic emulsified asphalts of the rapid-setting (CRS), medium-setting (CMS), and slow-setting (CSS) types conforming to AASHTO M 208.

## 2.3 MIXES

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes conforming to NJDOT Standard Specification Section 902.02 and complying with the following requirements:
1. Base Course: NJDOT HMA 12.5M64.
  2. Surface Course: NJDOT HMA 9.5M64.

## 2.4 AUXILIARY MATERIALS

- A. Pavement-Marking Paint: Epoxy resin that is a 2 component, 100 percent solids formulation conforming to NJDOT Standard Specification Section 912.03.01.
1. Color: White, yellow, or blue as indicated.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

#### 3.2 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd.
  - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

#### 3.3 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.
  - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

### 3.4 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
  - 1. Spread mix at minimum temperature of 250 deg F (121 deg C).
  - 2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### 3.5 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
  - 1. Clean contact surfaces and apply tack coat to joints.

### 3.6 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
  - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
  - 1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### 3.7 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  - 1. Base Course: Plus or minus 1/2 inch.
  - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
  - 1. Base Course: 1/4 inch.
  - 2. Surface Course: 1/8 inch.

### 3.8 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

### 3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

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- B. Replace and compact hot-mix asphalt where core tests were taken.
- C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.10 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION 02700



## SECTION 02920 - TURF AND GRASSES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Seeding.

B. Related Sections

1. Section 02231 "Site Clearing" for topsoil stripping and stockpiling.
2. Section 02300 "Earth Moving" for excavation, filling and backfilling, and rough grading.

#### 1.2 DEFINITIONS

- A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

- H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- I. Surface Soil: Whatever soil is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Certification of grass seed.
- C. Product certificates.

### 1.4 QUALITY ASSURANCE

- A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 1. Pesticide Applicator: State licensed, commercial.
- B. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory.
  - 1. The soil-testing laboratory shall oversee soil sampling.
  - 2. Report suitability of tested soil for turf growth.
    - a. State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    - b. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

### 1.6 MAINTENANCE SERVICE

- A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately



after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 60 days from date of planting completion.
  - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

## PART 2 - PRODUCTS

### 2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species: State-certified seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed; and consisting of a blend of cultivars rated in the top ten in the respective class:
  1. Maintained Areas: Proportioned by weight as follows:
    - a. 60 percent hard fescue.
    - b. 20 percent Kentucky bluegrass.
    - c. 20 percent perennial ryegrass, turf-type.
  2. Fringe Areas: Proportioned by weight as follows:
    - a. 33 percent switchgrass
    - b. 33 percent little bluestem
    - c. 33 percent broom sedge

### 2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, ground, pelletized or pulverized agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent, and as recommended by the Soil Analysis.
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Aluminum Sulfate: Commercial grade, unadulterated.
- E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

### 2.3 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/8-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.

### 2.4 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
  - 1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

### 2.5 PLANTING SOILS

- A. Planting Soil: Existing, in-place surface soil. Verify suitability of soil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
  - 1. Organic Matter: 5 percent.
  - 2. pH: 6.0 – 7.2.

### 2.6 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

## 2.7 PESTICIDES

- A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

## PART 3 - EXECUTION

### 3.1 TURF AREA PREPARATION

- A. Subgrade Compacted by Construction Activity: Loosen subgrade to a minimum depth of 18 inches with vertical trenches 24 inches apart. Loosen subsoil in two directions at right angles to each other. Recompact at 85 percent.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  - 1. Apply superphosphate fertilizer, if required by Soil Analysis, directly to subgrade before loosening.
  - 2. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
  - 3. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
- C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
  - 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
  - 2. Loosen surface soil to a depth of at least 8 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches of soil. Till soil to a homogeneous mixture of fine texture.
    - a. Apply superphosphate fertilizer, if required by Soil Analysis, directly to surface soil before loosening.
  - 3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
  - 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll

and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

### 3.2 SEEDING

- A. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seed at a total rate of 3 to 4 lb/1000 sq. ft.
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 1 tons/acre to form a continuous blanket 3/4 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
  - 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

### 3.3 TURF MAINTENANCE

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
- B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain height appropriate for species without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings.
- C. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

3.4 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:
  - 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 95 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 3 by 3 inches.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

END OF SECTION 02920



## SECTION 02930 - PLANTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Plants.
2. Planting soils.

#### 1.2 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- C. Finish Grade: Elevation of finished surface of planting soil.
- D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- F. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- G. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- H. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- I. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

- J. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- K. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, including soils.
- B. Product certificates.
- C. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year.

### 1.4 QUALITY ASSURANCE

- A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 1. Pesticide Applicator: State licensed, commercial.
- B. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory.
  - 1. The soil-testing laboratory shall oversee soil sampling.
  - 2. Report suitability of tested soil for plant growth.
    - a. State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    - b. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.
- C. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- D. Preinstallation Conference: Conduct conference at Project site.



## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.
- B. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- C. Handle planting stock by root ball.
- D. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- E. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

## 1.6 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
    - b. Structural failures including plantings falling or blowing over.
  - 2. Warranty Periods from Date of Substantial Completion:
    - a. Trees, Shrubs, Vines, and Ornamental Grasses: 24 months.
    - b. Ground Covers, Biennials, Perennials, and Other Plants: 24 months.
  - 3. Contractor shall supply a two-year landscape maintenance bond in a form acceptable to the Owner (refer to end of section).

## 1.7 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants

are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period for Trees and Shrubs: 24 months from date of Substantial Completion.
2. Maintenance Period for Ground Cover and Other Plants: 12 months from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
- B. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

### 2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent, and as recommended by Soil Analysis.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Aluminum Sulfate: Commercial grade, unadulterated.

### 2.3 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/8-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: Minimum 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolid; yard trimmings; or source-separated or compostable mixed solid waste.

## 2.4 FERTILIZERS

- A. Fertilizer: Commercial-grade fertilizer as required by the Soil Analysis. Provide organic, slow-release fertilizer whenever applicable

## 2.5 PLANTING SOILS

- A. Planting Soil: Existing, in-place surface soil. Verify suitability of soil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix soil with the following soil amendments in quantities as required by the Soil Analysis to produce the following planting soil:

1. Organic Matter: 10 percent.
2. pH: 6.0 – 7.2.

## 2.6 MULCHES

- A. Organic Mulch: Ground or shredded bark.

## 2.7 PESTICIDES

- A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

## PART 3 - EXECUTION

### 3.1 PLANTING AREA ESTABLISHMENT

- A. Loosen subgrade of planting areas to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  1. Apply superphosphate fertilizer directly to subgrade before loosening.

2. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
  3. Spread planting soil to a depth indicated on Drawings but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
- B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

### 3.2 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
1. Excavate to dimensions indicated on Drawing for ball and burlapped, and container grown stock.
  2. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
- B. Subsoil and topsoil removed from excavations shall be used as planting soil.

### 3.3 TREE AND SHRUB PLANTING

- A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1.
- B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Set stock plumb and in center of planting pit or trench with root flare relative to adjacent finish grades as indicated on Drawings.
1. Use planting soil as indicated on Drawings for backfill.
  2. Balled and Burlapped: After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  3. Container-Grown: Carefully remove root ball from container without damaging root ball or plant.

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4. Fabric Bag-Grown Stock: Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  5. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  6. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
  7. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

### 3.4 TREE AND SHRUB PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- C. Do not apply pruning paint to wounds.

### 3.5 GROUND COVER AND PLANT PLANTING

- A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.
- B. Use planting soil as indicated on Drawings for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- E. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

### 3.6 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
  - 1. Trees and Tree-like Shrubs in Turf Areas: Apply organic mulch ring of 3-inch average thickness, with 24-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
  - 2. Organic Mulch in Planting Areas: Apply 3-inch average thickness of mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

### 3.7 EDGING INSTALLATION

- A. Shovel-Cut Edging: Separate mulched areas from turf areas with a 45-degree, 4- to 6-inch deep, shovel-cut edge.

### 3.8 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.
- B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use practices to minimize the use of pesticides and reduce hazards.
- D. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- E. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

END OF SECTION 02930

## SECTION 03300 - CAST-IN-PLACE CONCRETE

### 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 specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.
- B. Related Sections include the following:
  - 1. Division 2 Section "Earthwork" for drainage fill under slabs-on-grade.
  - 2. Division 2 Section "Concrete Sidewalk" for concrete pavement and walks.

#### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Do not start concrete production until data has been reviewed and approved by the engineer.
- C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- D. Welding Certificates: Copies of certificates for welding procedures and personnel.
- E. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
- F. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

## SECTION 03300 - CAST-IN-PLACE CONCRETE

1. Cementitious materials and aggregates.
2. Form materials and form-release agents.
3. Steel reinforcement and reinforcement accessories.
4. Admixtures.
5. Curing materials.
6. Floor and slab treatments.
7. Vapor retarders.
8. Epoxy joint filler.
9. Joint-filler strips.
10. Repair materials.
11. Form liners
12. Reglets
13. Vapor retarder/barrier

### 1.5 QUALITY ASSURANCE

- A. **Installer Qualifications:** An experienced installer who has completed concrete Work 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. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for formwork and shoring and reshoring installations that are similar to those indicated for this Project in material, design, and extent.
- C. **Manufacturer Qualifications:** A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
  1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
- D. **Testing Agency Qualifications:** An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548. Contractor shall provide a storage box for concrete cylinders.
  1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- E. **Source Limitations:** Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- F. **Welding:** Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- G. **ACI Publications:** Comply with the following, unless more stringent provisions are indicated:



## SECTION 03300 - CAST-IN-PLACE CONCRETE

1. ACI 301, "Specification for Structural Concrete."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials." CRSI

### H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1. Before submitting design mixes, review concrete mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
  - a. Contractor's superintendent.
  - b. Independent testing agency responsible for concrete design mixes.
  - c. Ready-mix concrete producer.
  - d. Concrete subcontractor.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

## PART 2 - PRODUCTS

### 2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  1. Plywood, metal, or other approved panel materials.
  2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
    - a. High-density overlay, Class 1, or better.
- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
  1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of the exposed concrete surface.
  2. Furnish ties that, when removed, will leave holes not larger than 1 inch (25 mm) in diameter in concrete surface.

## SECTION 03300 - CAST-IN-PLACE CONCRETE

3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

### 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

### 2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
  1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.
- B. Joint Dowel Bars: Plain-steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.
- C. All hooks, unless otherwise noted, shall conform to "ACI Standard Hooks".
- D. Tie-wire shall not be less than 16 gauge wire

### 2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I/II.
- B. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:
  1. Nominal Maximum Aggregate Size: 3/4 inch.
- C. Fly Ash : ASTM C618, Type F
- D. Water: Potable and complying with ASTM C 94.

### 2.5 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Water-Reducing Admixture: ASTM C 494, Type A.

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- D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
- E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
- F. Water-Reducing and Retarding Admixture” ASTM C 494, Type D.

### 2.6 VAPOR BARRIER SYSTEM

- A. Vapor Barrier System: ASTM E 1745, Class A, polyolefin sheet, not less than 10 mil.
- B. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a No. 4 sieve and 10 to 30 percent passing a No. 100 sieve; meeting deleterious substance limits of ASTM C 33 for fine aggregates.
- C. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

### 2.7 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Solvent-Borne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- G. Products: Subject to compliance with requirements, provide one of the following or approved equal:
  - 1. Evaporation Retarder:
    - a. Sure Film; Dayton Superior Corporation.
    - b. Eucobar; Euclid Chemical Co.
    - c. E-Con; L&M Construction Chemicals, Inc.
    - d. Confilm; Master Builders, Inc.
    - e. Waterhold; Metalcrete Industries.
    - f. Rich Film; Richmond Screw Anchor Co.
    - g. SikaFilm; Sika Corporation.
    - h. Finishing Aid; Symons Corporation.

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2. Clear, Solvent-Borne, Membrane-Forming Curing Compound:
  - a. Nitocure S; Fosroc.
  - b. Cure & Seal 309; Kaufman Products Inc.
  - c. L&M Dress & Seal 18; L&M Construction Chemicals, Inc.
  - d. CS-309; W. R. Meadows, Inc.
  - e. Seal N Kure; Metalcrete Industries.
  - f. Rich Seal 14 percent UV; Richmond Screw Anchor Co.
  - g. Kure-N-Seal; Sonneborn, Div. of ChemRex, Inc.
  - h. Clear Seal 150; Tamms Industries Co., Div. of LaPorte Construction Chemicals of North America, Inc.
  
3. Clear, Waterborne, Membrane-Forming Curing Compound:
  - a. Safe Cure and Seal; Dayton Superior Corporation.
  - b. Aqua Cure VOX; Euclid Chemical Co.
  - c. Dress & Seal WB; L&M Construction Chemicals, Inc.
  - d. Vocomp-20; W. R. Meadows, Inc.
  - e. Metcure; Metalcrete Industries.
  - f. Cure & Seal 150E; Nox-Crete Products Group, Kinsman Corporation.
  - g. Cure & Seal 14 percent E; Symons Corporation.
  - h. Seal Cure WB 150; Tamms Industries Co., Div. of LaPorte Construction Chemicals of North America, Inc.

### 2.8 RELATED MATERIALS

- A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
  1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
  2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
  3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Reglets: Fabricate reglets of not less than 0.0217-inch- thick galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- F. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

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### 2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
  4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Topping: Traffic-bearing, cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
  4. Compressive Strength: Not less than 5700 psi at 28 days when tested according to ASTM C 109/C 109M.

### 2.10 CONCRETE MIXES

- A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:
1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
- B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.
- C. Footings and Foundation Walls: Proportion normal-weight concrete mix as follows:
1. Compressive Strength (28 Days): 4000 psi.
  2. Maximum Slump: 3 inches.
  3. Maximum Slump for Concrete Containing High-Range Water-Reducing Admixture: 8 inches after admixture is added to concrete with site-verified 2- to 3-inch slump.
- D. Slab-on-Grade: Proportion normal-weight concrete mix as follows:
1. Compressive Strength (28 Days): 4000 psi.
  2. Maximum Slump: 4 inches.
- E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

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1. Fly Ash: 25 percent.
  - F. Maximum Water-Cementitious Materials Ratio: 0.40 for concrete required to have low water permeability. This includes elevator pits and basement walls.
  - G. Maximum Water-Cementitious Materials Ratio: 0.40 for concrete exposed to deicers or subject to freezing and thawing while moist. This includes exterior slabs and walls.
  - H. Maximum Water-Cementitious Materials Ratio: 0.40 for corrosion protection of steel reinforcement in concrete exposed to chlorides from deicing chemicals, salt, saltwater, brackish water, seawater, or spray from these sources.
  - I. Maximum Water-Cementitious Materials Ratio: 0.40 for all interior slabs.
  - J. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5 percent, unless otherwise indicated:
    1. Air Content: 5.5 percent for 1-1/2-inch- nominal maximum aggregate size.
    2. Air Content: 6 percent for 1-inch- nominal maximum aggregate size.
    3. Air Content: 6 percent for 3/4-inch- nominal maximum aggregate size.
  - K. Do not air entrain concrete to trowel-finished interior floors and suspended slabs. Do not allow entrapped air content to exceed 3 percent.
  - L. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
  - M. Admixtures: Use admixtures according to manufacturer's written instructions.
    1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
    2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
    3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
    4. Use corrosion-inhibiting admixture in concrete mixes where indicated.
- 2.11 FABRICATING REINFORCEMENT
- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."
- 2.12 CONCRETE MIXING
- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

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1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Only when specifically approved by the Architect. Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
  1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
  2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
  3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

### PART 3 - EXECUTION

#### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
  1. Class A, 1/8 inch for surfaces exposed to view.
  2. Class C, 1/2 inch all other surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
  1. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to

## SECTION 03300 - CAST-IN-PLACE CONCRETE

prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Do not chamfer corners or edges of concrete.
- J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor bolts, accurately located, to elevations required.
  - 2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
  - 3. Install dovetail anchor slots in concrete structures as indicated.

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
- B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:
  - 1. At least 70 percent of 28-day design compressive strength.
- C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.



## SECTION 03300 - CAST-IN-PLACE CONCRETE

- D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.4 SHORES AND RESHORES

- A. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and reshoring.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

### 3.5 VAPOR BARRIER SYSTEM

- A. Vapor Barrier System: Place, protect, and repair vapor-barrier sheets according to ASTM E 1643 and manufacturer's written instructions. Lap joints 6 inches minimum and seal with manufacturer's tape.

### 3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  - 1. Do not cut or puncture vapor barrier. Repair damage and reseal vapor barrier before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
  - 1. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

### 3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

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- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
  3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-third of concrete thickness, as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete as soon as possible when cutting action will not dislodge aggregate or otherwise damage surface usually 1 to 2 hours depending on mix design, environmental conditions, etc. and before concrete develops random contraction cracks, typically 1 to 2 hours depending on mix design, environmental conditions, etc.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
  2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated.

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1. Use dowel sleeves or lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

### 3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by Architect.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation. Limit Free-Fall to a height of five (5) feet.
- D. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.
  1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
  2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  2. Maintain reinforcement in position on chairs during concrete placement.
  3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  4. Slope surfaces uniformly to drains where required.
  5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.

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2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- G. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
  3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.
1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
  2. Do not apply rubbed finish to smooth-formed finish.
- C. Rubbed Finish: Apply the following to smooth-formed finished concrete:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
  2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
  3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

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- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

### 3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.
  - 1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
  - 1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system
  - 2. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface:
    - a. For thin-set flooring or resilient floor covering: Specified overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness, F(L) 17.
    - b. For carpet floors: Specified overall values of flatness, F(F) 25; and levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and levelness, F(L) 15.
- E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

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- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
  - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### 3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs where indicated by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

### 3.12 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than

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seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
  - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
  - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid epoxy joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

### 3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges

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- of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  2. After concrete has cured at least 14 days, correct high areas by grinding.
  3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.



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- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.15 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage and pay for a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
  - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  - 3. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
  - 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
  - 5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
  - 6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
  - 7. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
    - a. Cast and field cure one set of four standard cylinder specimens for each composite sample.
  - 8. Compressive-Strength Tests: ASTM C 39; test two laboratory-cured specimens at 7 days and two at 28 days.
    - a. Test two field-cured specimens at 7 days and two at 28 days.
    - b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.
- C. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

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- D. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- E. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.
- F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

END OF SECTION 03300

## SECTION 04720 – CAST STONE MASONRY

### **PART 1 -GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Cast stone masonry including window/door structural header, jamb sill, water table, trim, and date stone. See drawings for size, shape and locations.

#### **1.2 DEFINITIONS**

- A. Cast Stone Masonry: Highly refined architectural concrete stone product, manufactured to simulate fine-grain texture of natural stone.

#### **1.3 REFERENCE STANDARDS**

- A. ASTM C 150 / C 150M - Standard Specification for Portland Cement.
- B. ASTM C 1116 / C 1116M - Standard Specification for Fiber-Reinforced Concrete.
- C. ASTM C 1364 - Standard Specification for Architectural Cast Stone.
- D. Cast Stone Institute Standard Specification ([www.caststone.org](http://www.caststone.org)).

#### **1.4 SUBMITTALS**

- A. Comply with Section 01300 - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data.
- C. Shop Drawings: Submit manufacturer's shop drawings including profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, annotation of components, structural calculations, and their locations in project as indicated on the Drawings.
- D. Shop Tickets: Submit manufacturer's shop tickets including profiles, cross sections, modular unit lengths, reinforcement, exposed faces, and annotation of components proposed for use in project according to cross sections as indicated on the Drawings.
- E. Catalog Cuts: Submit manufacturer's catalog cuts showing page and product numbers of units proposed for use in project.
- F. Verification Samples: Submit pieces of actual cast stone components, 12 inches (305 mm) square, illustrating range of color and texture to be anticipated in components furnished for project.
- G. Test Results: Submit manufacturer's test results of cast stone components made previously by manufacturer using materials from same sources proposed for use in project.

## SECTION 04720 – CAST STONE MASONRY

### **1.5 QUALITY ASSURANCE**

- A. **Manufacturer's Qualifications:** A Cast Stone Institute Certified Producer, with a minimum of 10 years of experience in producing cast stone of types required for project.
  - 1. Plant shall have adequate capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the Work.
  - 2. Products previously produced by plant and exposed to weather shall exhibit satisfactory appearance.
  
- B. **Standards:** Unless otherwise specified in this section, cast stone shall comply with the following:
  - 1. ASTM C 1364.
  - 2. Cast Stone Institute Standard Specification.
  
- C. **Mock-ups:** Provide full-size cast stone components for installation in mock-up of exterior wall. Approved mock-ups will become standard for appearance and workmanship.
  - 1. Mock-ups shall not remain as part of the completed Work. At Architect's direction, demolish mock-ups and remove debris.

### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. **Delivery:**
  - 1. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration.
  - 2. Protect corners from damage.
  - 3. Number each piece individually to match shop drawings and schedules.
  
- B. **Storage:**
  - 1. Store cast stone components and installation materials in accordance with manufacturer's instructions.
  - 2. Store cast stone components on pallets with nonstaining, waterproof covers.
  - 3. Ventilate under covers to prevent condensation.
  - 4. Prevent contact with dirt.
  
- C. **Handling:** Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.

### **1.7 SCHEDULING**

- A. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the Work.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURER**

## SECTION 04720 – CAST STONE MASONRY

- A. Manufacturer:
  - 1. Continental Cast Stone, Website [www.continentalcaststone.com](http://www.continentalcaststone.com), (Basis of the Design)
  - 2. Or approved equal.

### **2.2 CAST STONE MASONRY**

- A. Cast Stone:
  - 1. Compressive Strength: ASTM C 1364.
  - 2. Absorption, Cold Water: ASTM C 1364.
  - 3. Linear Shrinkage: ASTM C 1364.
- B. Surface Texture: ASTM C 1364.
- C. Color and Finish:
  - 1. Continental Cast Stone Color No.: 1100 to 1103, selected by Owner/Architect with smooth finish.
- D. Permissible Variation in Color:
  - 1. Total Color Difference: ASTM C 1364, 6 units.
  - 2. Hue Difference: ASTM C 1364, 2 units.

### **2.3 CAST STONE MATERIALS**

- A. Portland Cement: ASTM C 150, Type I; white or gray as required to match specified color.
- B. Coarse Aggregate: ASTM C 1364; granite, quartz, or limestone.
- C. Fine Aggregate: ASTM C 1364, natural or manufactured sands.
- D. Coloring Pigments: ASTM C 1364, inorganic iron oxides.
- E. Chemical Admixtures: ASTM C 1364.
- F. Water: Potable.
- G. Reinforcement: Where required by ASTM C 1364, galvanized steel.
- H. Fiber Reinforcement: ASTM C 1116, fibrous nylon.

### **2.4 MORTAR MATERIALS**

- A. Mortar: Cast Stone Institute Standard Specification

### **2.5 ACCESSORIES**

- A. Anchors: Non-corrosive type, sized for conditions. Type 304 stainless steel.
- B. Sealants: As specified in Section 07920.
- C. Cleaner:

## SECTION 04720 – CAST STONE MASONRY

1. Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces.
2. Approved for intended use by cast stone masonry manufacturer and approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

### **2.6 FABRICATION**

- A. Shapes: Unless otherwise indicated on the Drawings, provide:
  1. Suitable wash on exterior sills, copings, projecting courses, and components with exposed top surfaces.
  2. Drips on projecting components, wherever possible.
- B. Reinforcement:
  1. As required to withstand handling and structural stresses. Header unit has reinforcement to carry load for veneer above.
  2. Comply with ASTM C 1364.
  3. Minimum of 0.25 percent of cross-sectional area of panels which exceed 24 inches (600 mm) in width.
  4. Minimum Reinforcing Cover: Twice diameter of reinforcing bars.
  5. Units less than 24 inches in either transverse or longitudinal direction may be unreinforced in that direction if structural conditions allow.
- C. Curing:
  1. Cure cast stone components with a direct-fired steam generator at a minimum temperature of 105 degrees F (41 degrees C) for a minimum of 6 hours, within 12 hours of fabrication.
  2. Cure cast stone components in presence of carbon monoxide and carbon dioxide to promote carbonation at surface, to minimize efflorescence.
- D. Finishing: Remove blemishes from exposed surfaces before packaging for shipment.
- E. Manufacturing Tolerances: Manufacture cast stone components within tolerances in accordance with Cast Stone Institute Standard Specification.

### **2.7 SOURCE QUALITY CONTROL**

- A. Sampling and Testing: ASTM C 1364.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Examine construction to receive cast stone masonry. Notify Architect if construction is not acceptable. Do not begin installation until unacceptable conditions have been corrected.
- B. Visual Inspection:
  1. Visually inspect cast stone components for fit and finish in accordance with ASTM C 1364 before installation.
  2. Do not install unacceptable components.

## SECTION 04720 – CAST STONE MASONRY

### **3.2 INSTALLATION**

- A. General: Install cast stone masonry in conjunction with unit masonry, complying with Section 04810.
- B. Setting:
  - 1. Drench cast stone components with clear, running water immediately before installation.
  - 2. Do not use pry bars or other equipment in a manner that could damage cast stone components.
  - 3. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
  - 4. Set cast stone components in a full bed of mortar, unless otherwise indicated on the Drawings.
  - 5. Fill vertical joints with mortar.
  - 6. Make joints 3/8 inch (9 mm), unless otherwise indicated on the Drawings.
  - 7. Leave head joints in copings and similar components open for sealant.
  - 8. Rake mortar joints 3/4 inch (19 mm) for pointing.
  - 9. Sponge face of each stone to remove excess mortar.
  - 10. Tuck point joints to a slight concave profile.
- C. Sealant Joints:
  - 1. Comply with Section 07920.
  - 2. Prime ends of cast stone components, insert properly sized foam backing rod, and install required sealant using sealant gun.
  - 3. Provide sealant joints at following locations and as indicated on the Drawings.
    - a. Cast stone components with exposed tops.
    - b. Joints at relieving angles.
    - c. Control and expansion joints.

### **3.3 SETTING TOLERANCES**

- A. Tolerances: Comply with Cast Stone Institute Standard Specification.
  - 1. Variation from Plumb: Do not exceed 1/8 inch in 5 feet (3 mm in 1.5 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
  - 2. Variation from Level: Do not exceed 1/8 inch in 5 feet (3 mm in 1.5 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
  - 3. Variation in Joint Width: Do not vary joint width more than 1/8 inch (3 mm) or 1/4 of nominal joint width, whichever is greater.
  - 4. Variation in Plane Between Adjacent Surfaces: Do not exceed 1/8-inch (3-mm) difference between planes of adjacent components or adjacent surfaces indicated to be flush with components.

### **3.4 REPAIR**

- A. Surface Repair:
  - 1. Repair chipping and other surface damage noticeable when viewed in direct daylight at 20 feet (6 m).
  - 2. Repair with matching touchup material provided by manufacturer and in accordance with manufacturer's instructions.
  - 3. Repair methods and results to be approved by Architect.

## SECTION 04720 – CAST STONE MASONRY

### **3.5 FIELD QUALITY CONTROL**

- A. Inspection and Acceptance: Cast Stone Institute Standard Specification.

### **3.6 CLEANING**

- A. In-Progress Cleaning:
  - 1. Clean cast stone components as work progresses.
  - 2. Remove mortar fins and smears before tooling joints.
  
- B. Final Cleaning:
  - 1. Clean exposed cast stone, after mortar is thoroughly set and cured.
  - 2. Cleaner:
    - a. Wet surfaces with water before applying cleaner.
    - b. Apply cleaner to cast stone in accordance with cleaner manufacturer's instructions.
    - c. Remove cleaner promptly by rinsing thoroughly with clear water.

### **3.7 WATER REPELLANT**

- A. Apply silane or siloxane water repellent for weatherproofing cast stone masonry in accordance with manufacturer's instructions. See Specification 07200 for requirements.
  
- B. Apply water repellent after pointing, repair, cleaning, inspection, and acceptance are completed.

### **3.8 PROTECTION**

- A. Protect installed cast stone masonry from splashing and other damage during construction.

**END OF SECTION**



## SECTION 04810 - UNIT MASONRY ASSEMBLIES

### 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 unit masonry assemblies consisting of the following when indicated:
  - 1. Concrete masonry units.
  - 2. Building (common) brick.
  - 3. Mortar and grout.
  - 4. Reinforcing steel.
  - 5. Masonry joint reinforcement.
  - 6. Ties and anchors.
  - 7. Embedded flashing.
  - 8. Miscellaneous masonry accessories.
  - 9. Cavity-wall insulation.
- B. Products furnished, but not installed, under this Section include the following:
  - 1. Dovetail slots for masonry anchors, installed under Division 3 Section "Cast-in-Place Concrete."
  - 2. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 5 Section "Structural Steel."
- C. Products installed, but not furnished, under this Section include the following:
  - 1. Steel lintels and shelf angles for unit masonry, furnished under Division 5 Section "Metal Fabrications."
  - 2. Manufactured reglets in masonry joints for metal flashing, furnished under Division 7 Section "Sheet Metal Flashing and Trim."
  - 3. Hollow-metal frames in unit masonry openings, furnished under Division 8 Section "Steel Doors and Frames."

#### 1.3 DEFINITIONS

- A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

#### 1.4 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.
- B. Shop Drawings: Show fabrication and installation details for the following:

## SECTION 04810 - UNIT MASONRY ASSEMBLIES

1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
  2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection: For the following:
1. Unit masonry Samples in full-scale form showing the full range of colors and textures.
  2. Colored mortar Samples showing the full range of colors.
- D. Samples for Verification: For the following:
1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
  2. Colored mortar Samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
  3. Stone trim samples not less than 12 inches in length, showing the full range of colors and textures expected in the finished construction.
  4. Weep holes/vents in color to match mortar color.
  5. Accessories embedded in the masonry.
- E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- G. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
1. Each type of masonry unit required.
    - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
    - b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units.
  2. Mortar complying with property requirements of ASTM C 270
  3. Grout mixes complying with compressive strength requirements of ASTM C 476. Include description of type and proportions of grout ingredients.
- H. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
1. Each type of masonry unit required.

## SECTION 04810 - UNIT MASONRY ASSEMBLIES

- a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
  - b. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.
2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
  3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
  4. Each material and grade indicated for reinforcing bars.
  5. Each type and size of joint reinforcement.
  6. Each type and size of anchor, tie, and metal accessory.
- I. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

### 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.
- B. Contractor shall employ and pay a qualified professional engineer to provide a survey and inspection of foundations for compliance with dimensional tolerances.
- C. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.
- D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- E. Preconstruction Testing Service: The Contractor shall employ and pay for a qualified independent testing agency to perform the following preconstruction testing:
1. Concrete Masonry Unit Test: For each concrete masonry unit indicated, per ASTM C 140.
  2. Prism Test: For each type of wall construction indicated, per ASTM C 1314].
  3. Mortar Test: For mortar properties per ASTM C 270.
  4. Grout Test: For compressive strength per ASTM C 1019.
- F. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
- G. Mockups: Before installing unit masonry, build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

## SECTION 04810 - UNIT MASONRY ASSEMBLIES

1. Locate mockups in the locations indicated or, if not indicated, as directed by Architect.
  2. Build mockups for the following types of masonry in sizes approximately 48 inches long by 48 inches high by full thickness, including face and backup wythes and accessories. Include a sealant-filled joint at least 16 inches long in each mockup.
    - a. Typical exterior wall with lower corner of window opening framed with stone trim at upper corner of mockup. Make opening approximately 12 inches wide by 16 inches high.
  3. Clean exposed faces of mockups with masonry cleaner as indicated.
  4. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
  5. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  6. Protect accepted mockups from the elements with weather-resistant membrane.
  7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  8. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
    - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
    - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.
  9. Demolish and remove mockups when directed.
  10. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- H. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
  1. Protect Type I concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store pre-blended, dry mortar mix in delivery containers on

## SECTION 04810 - UNIT MASONRY ASSEMBLIES

elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

### 1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. This specification supersedes ACI 530.1/ASCE 6/TMS 602 in that masonry shall not be installed when the ambient temperature is 32 degF or below or the temperature of the masonry units is below 32degF, unless a heated temporary enclosure is provided for a minimum of 24 hours. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602 when the ambient temperature is above 32degF. masonry products shall always be protected from the elements.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

- E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.

1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

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### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
  - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

#### 2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
  - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

#### 2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Provide bullnose units for outside corners unless otherwise indicated.
- B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.

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1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514/E 514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.

### C. CMU: ASTM C90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi minimum and as noted in drawings.
2. Density Classification: Medium weight unless otherwise indicated.
3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
4. Exposed Faces: provide color and texture matching the range represented by Architect's sample.
5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

### D. Concrete Building Brick: ASTM C 55.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi minimum and as noted in the drawings.
2. Density Classification: Medium weight.
3. Size (Actual Dimensions): 3-5/8 inches wide by 3-5/8 inches high by 7-5/8 inches long.

## 2.5 CONCRETE AND MASONRY LINTELS

- A. General: Provide as shown in drawings.
- B. Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated.
- C. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Section "Cast-in-Place Concrete", and with reinforcing bars indicated.
- D. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CUMs in color, texture, and density classification, with reinforced bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

## 2.6 BRICK

- A. General: Provide utility brick.
  1. Provide Belden Brick Products (Basis of Design) or equal by Glen Gery Brick Endicott Brick or approved equal.
- B. Provide shapes indicated and as follows for each form of brick required:
  1. Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.

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- C. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
  - 1. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
  - 2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- D. Building Brick: ASTM C 216, Grade SW, Type FBX and as follows:
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 5,500 psi.
  - 2. Size: Manufactured to the following actual dimensions:
    - a. Utility: 3-5/8 inches wide by 3-5/8 inches high by 11 5/8 inches long (Type FBX).
  - 3. Application: Use where brick is indicated for concealed locations. Note that hollow brick is not simply face brick with the usual cores (holes); it is brick that has voids (cores and cells) exceeding 25 percent of the gross cross-sectional area. See Evaluations.
  - 4. Color and texture: Selected by Owner/Architect

### 2.7 MORTAR AND GROUT MATERIALS

- A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
- E. Mortar Cement: ASTM C 1329.
- F. Masonry Cement: ASTM C 91.
  - 1. For pigmented mortar, use a colored cement formulation as required to produce the color indicated or, if not indicated, as selected from manufacturer's standard formulations.
    - a. Pigments shall not exceed 10 percent of portland cement by weight for mineral oxides nor 2 percent for carbon black.
    - b. Pigments shall not exceed 5 percent of mortar cement by weight for mineral oxides nor 1 percent for carbon black.
  - 2. For colored-aggregate mortar, use natural color or white cement as necessary to produce required mortar color.



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- G. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
  - 1. White-Mortar Aggregates: Natural white sand or ground white stone.
  - 2. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
- H. Aggregate for Grout: ASTM C 404.
- I. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.
- J. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units (and approved for such use by manufacturer of the units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.
- K. Cold-Weather Admixture: Permitted in accordance with ASTM C 494 Type E. No masonry work below 32 deg F.
- L. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.
- M. Water: Potable.
- N. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- O. Products: Subject to compliance with requirements, provide one of the following or approved equal:
  - 1. Colored Portland Cement-Lime Mix:
    - a. Eaglebond; Blue Circle Cement.
    - b. Color Mortar Blend; Glen-Gery Corporation.
    - c. Rainbow Mortamix Custom Color Cement/Lime; Holnam, Inc.
    - d. Centurion Colorbond PL; Lafarge Corporation.
    - e. Lehigh Custom Color Portland/Lime; Lehigh Portland Cement Co.
    - f. Riverton Portland Cement Lime Custom Color; Riverton Corporation (The).
  - 2. Mortar Cement:
    - a. Magnolia Superbond Mortar Cement; Blue Circle Cement.
    - b. Lafarge Mortar Cement; Lafarge Corporation.
    - c. Essroc Cement Corporation.
  - 3. Colored Mortar Cement:
    - a. Magnolia Superbond Mortar Cement; Blue Circle Cement.
    - b. Spec Mix, Inc.
    - c. Montfort Bros.

## SECTION 04810 - UNIT MASONRY ASSEMBLIES

4. Colored Masonry Cement:
  - a. Magnolia Masonry Cement; Blue Circle Cement.
  - b. Brixment-in-Color; Essroc Materials, Inc.
  - c. Rainbow Mortamix Custom Color Masonry Cement; Holnam, Inc.
  - d. Centurion Colorbond; Lafarge Corporation.
  - e. Lehigh Custom Color Masonry Cement; Lehigh Portland Cement Co.
  - f. Coosa Masonry Cement; National Cement Company, Inc.
  - g. Flamingo Color Masonry Cement; Riverton Corporation (The).
  - h. Richcolor Masonry Cement; Southdown, Inc.
  
5. Mortar Pigments:
  - a. True Tone Mortar Colors; Davis Colors.
  - b. Centurion Pigments; Lafarge Corporation.
  - c. SGS Mortar Colors; Solomon Grind-Chem Services, Inc.
  
6. Water-Repellent Admixture: See Section 07200

### 2.8 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
  
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
  
- C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
  1. Interior Walls: Mill-galvanized carbon steel.
  2. Exterior Walls: **STAINLESS STEEL**.
  3. Wire Size for Side Rods: 0.148-inch diameter.
  4. Wire Size for Cross Rods: 0.148-inch diameter.
  5. Wire Size for Veneer Ties: 0.187-inch diameter.
  6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
  7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.
  
- D. Masonry-Joint Reinforcement for Multiwythe Masonry:
  1. Adjustable (two-piece) type, **STAINLESS STEEL** ladder design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-winged loops connections having a maximum horizontal play of 1/16 inch and maximum vertical adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.
  2. Basis of Design: Hohman & Barnard #265 adjustable ladder joint reinforcement with 2X-Hook, standard weight, with hook spacing of 16 inches on center. Provide prefabricated tees and corners. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.
  3. Provide H&B stainless steel adjustable wall ties, 3/16-inch diameter pintles and 3/16-inch diameter eyes with 2X-Hooks, Locate where additional ties are required at masonry openings and veneer movement joints.

## SECTION 04810 - UNIT MASONRY ASSEMBLIES

### E. BRICK MASONRY JOINT REINFORCEMENT

1. Stainless steel, truss type, with two side rods, one at each face of brick, with at least 5/8" cover on outside face.

### 2.9 TIES AND ANCHORS

- A. General: ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 641/A 641M, Class 1 coating.
2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
3. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.
4. Galvanized-Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
5. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel with ASTM A 153/A 153M, Class B coating.
6. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.
7. Steel Plates, Shapes and Bars: ASTM A 36/A 36M.
8. Stainless-Steel Bars: ASTM A276 or ASTM A 666, Type 304.

- C. Welded adjustable anchors for Connecting to Structural Steel Framing: Where indicated, or required, provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch diameter, hot-dip galvanized steel wire.
2. Tie Section: Triangular-shaped wire tie made from 0.25-inch diameter, hot-dip galvanized steel wire.
3. Basis of design: Hohman & Barnard #359-C weld-on ties, with 8 inch offsets, 1/4 inch wire, Vee-Byna tie, wire diameter to match net tie space between structural steel and inside of weld-on ties plus or minus 1/16 inch clearance max, hot dip galvanized, shop welded to steel.
4. Touch up welds with zinc-rich coating per approved shop paint SSPC-Paint 20 manufacturer's recommendations.

- D. Rigid anchors can be used to connect T-intersections of CMU shear walls in lieu of masonry bonding or bond beams. They are also often used at T-intersections of other CMU walls, although masonry bonding and T-shaped masonry-joint reinforcement may be used.

- E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

- F. Adjustable Masonry-Veneer Anchors:

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1. General: Provide Stainless Steel anchors that allow vertical adjustment but resist a minimum of 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.
2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.078-inch thick, stainless-steel sheet.
3. Fabricate wire ties from 0.187 inch diameter, **STAINLESS STEEL** wire.
4. Screw or and post installed anchor attached, Masonry-Veneer Anchors: Wire tie and a rib-stiffened, sheet metal anchor section with screw holes top and bottom, with a projecting vertical tab having a slotted hole for inserting wire tie.
  - a. Attached to existing CMU
    - 1) Basis of Design: Hohmann & Barnard HB-5213 adjustable veneer anchor with 2X-Hook and insulation retaining washer.
    - 2) Fasten to existing CMU with 3/8-inch diameter stainless-steel sleeve anchor (Basis of Design: Powers Fasteners, Powerbolt) hex head sleeve anchor with 1 1/4 inch embedment in CMU faceshell and located within cell of CMU per manufacturer's requirements.
    - 3) Acceptable products:
      - a) CTP-516 with CTP 2" post installed stainless steel and 2" bronze expansion anchor and insulation retaining washer.  
[www.ctpanchors.com](http://www.ctpanchors.com).
      - b) Or approved equal
  - b. Attached to steel studs
    - 1) Basis of Design: Hohmann & Barnard H&B-213 adjustable stainless steel veneer anchor, 2X-Hook and insulation retaining washer.
    - 2) Fasten to steel stud with two (2) #10-16 hex head self-drilling screws with bonded neoprene washer and corrosion protective coating (Basis of Design: Hilti, Self-Drilling Screws and Kwik-Cote coating).
    - 3) Other acceptable products:
      - a) CTP-16 with fasteners noted above and insulation retaining washer.
      - b) Or approved equal.
  - c. Attached to structural steel where indicated.
    - 1) Unless noted otherwise, Basis of Design: Hohmann & Barnard HB-213 stainless steel adjustable veneer anchor, 2X hooks and insulation retaining washer.
    - 2) Where indicated: Hohmann & Barnard 359-FH Stainless Steel with Vee Byna-Tie, 3 /16" wire tie diameter.
    - 3) Fasten to structural steel with two (2) 1/4 x 20 (Basis of Design: HILTI BI-METAL KWIK FLEX with HEX) washer head self-drilling fasteners.
    - 4) Other acceptable products:
      - a) CTP-16 with fasteners noted above and insulation retaining washer.  
[www.ctpanchors.com](http://www.ctpanchors.com)
      - b) Or approved equal.

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### 2.10 FLEXIBLE FLASHING TYPE 304 STAINLESS STEEL

#### A. LAMINATED STAINLESS STEEL FABRIC FLASHING, NON-ASPHALTIC.

#### B. Definitions:

1. Cavity wall flashing: Same as flexible flashing.
2. Foundation sill flashing: Same as flexible flashing.
3. Flexible flashing: Water-proof material typically used in cavity wall construction to contain and assist in the proper water drainage that may penetrate wall system veneer. Other materials may be required to constitute the system.
4. Head and sill flashing: Same as flexible flashing.
5. Through-wall flashing:
  - a. Generally considered the same as flexible flashing.
  - b. Rare definition referred to full width cap flashing under copings or wall caps.

#### C. Submittals: Provide these documents in one complete shop drawings.

1. Product data: Indicate material type, composition, thickness, and installation procedures.
2. Samples: 3" by 5" flashing material.
3. Product quality and environmental submittals
  - a. Certificates:
    - 1) Indicate materials supplied or installed are asbestos free.
    - 2) Indicate recycled content: 60% total recycled material; based on 60% Post Industrial Recycled Content.
  - b. Minimum Performance Requirements:
    - 1) Tensile strength, 100,000 psi minimum average
    - 2) Puncture Resistance, 2,500 pounds average
    - 3) When tested as manufactured, product resists growth of mold pursuant to test method ASTM D3273.
    - 4) Fire Rating: flame spread and smoke generation
      1. Rated Class A, ASTM E84
    - 5) Certify the use of domestic manufactured stainless steel for flashing.
    - 6) Certify products contain no silica or asbestos.
4. Required Compatibility letter:
  - a. Provide compatibility letter from the Air Barrier System and Flashing System manufacturer.

#### D. QUALITY ASSURANCE

##### 1. Qualifications:

- a. Manufacturer: Provide flashing materials by single manufacturer with not less than twenty-five years of experience in manufacturing flexible flashing products.
- b. Flashing materials must be able to withstand 300° F temperature without changing the long-term performance of the flashing.

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- E. Required Compatibility Letter: Provide compatibility letter from the Air Barrier System and Flashing System manufacturer.
- F. Warranty
  - 1. Special warranty:
    - a. Manufacturer: Warrant flexible flashing material for life of the wall
    - b. Begin warranty at the Date of Substantial Completion.
- G. MANUFACTURED UNITS
  - 1. Product standard of quality:
    - a. York Manufacturing, Inc.; Multi-Flash SS- Basis of Design.
    - b. Illinois Products, Inc.; IPCO Stainless Steel Fabric Flashing
    - c. Prosoco, Inc.; R-Guard SS ThruWall
    - d. STS Coatings, Inc.; Wall Guardian Stainless Steel TWF
    - e. TK Products, Inc.; TK TWF
    - f. Approved equal products that meet the criteria in section 1.04 to 1.06.
  - 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.
- H. ACCESSORIES:
  - 1. Mastic/sealant: The Basis of Design is York Manufacturing, Inc.; UniverSeal US100 or approved equal.
    - a. Characteristics:
      - 1) Type: One part 100% solids, solvent-free formulated silyl-terminated polyether (STPE), ASTM C920-11, Type S, Grade NS, Class 50.
  - 2. End dam: Provide preformed pieces by the flashing manufacturer using:
    - a. Stainless steel: 26 gauge stainless steel
  - 3. Splice material: Product standard of quality is York304 SS by York or approved equal. Manufacturer's standard self-adhered metal material; material matching system material or use Multi-Flash Stainless Steel 6" lap piece and polyether sealant as a splice.
  - 4. 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.

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5. Weep vent protection: Product standard of quality is York's Weep Armor or approved equal. Geotextile drainage fabric at least 12" in height.
6. Repair and other materials/accessories: Manufacturer's standard.
7. Fasteners: 304 Stainless Steel Domestic manufactured fastener types and sizes recommended by flashing manufacturer for intended use.

### I. INSTALLATION

#### 1. General

- a. Install where indicated, specified, or required in accord with flashing manufacturer's written instructions and as follows.
- b. Extend flashing 8" minimum beyond opening. Provide pre-manufactured end dam units made of 26 gauge stainless steel.
- c. Flashing width: Width required starting flush with outside face of exterior wythe, extending through cavity, rising height required to extend above lintel steel at least 2". **Flashing shall be installed a minimum of 1" past the face of veneer and cut off flush after inspection by C. M. or Architect.**
- d. Splice end joints by overlapping them 6" and seal with a compatible sealant or metal splice tape.
- e. Masonry back up:
  - 1) Coordinate with fluid applied membrane air barrier installation, in accordance with manufacturer's installation instructions.
  - 2) Embed flashing between CMU masonry installation and seal the top edge with compatible sealant.
- f. Concrete back up:
  - 1) Surface apply after fluid applied membrane air barrier installation in accordance with manufacturer's installation instructions.
  - 2) Fasten to concrete surface at top by embedding in layer of sealant or use a non-corrosive termination bar and fasten it to the backer wall at the top edge of the flashing and seal the top edge with a compatible sealant.
- g. Stud back up with sheathing:
  - 1) Fasten to stud back-up. Install double faced butyl tape then install a non-corrosive termination bar and fasten it to the backer wall at the top edge of the flashing and seal the top edge with a compatible sealant.
- h. Leave ready for certified compatible air barrier installation lapping flashing top installed in another Section.
- i. Lay flashing in continuous bead of sealant on masonry supporting steel.
- j. Provide purchased manufacturers preformed end dams.
- k. Inside and outside corners: Provide purchase manufactured corners from manufacturer.
- l. Cover flashing within a few days of installation to protect it from damage from the different trades, the environment and falling debris. If flashing is left unprotected

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and it is punctured, torn, or has loose scrim you should contact the manufacturer for repair instructions.

### J. SCHEDULES

#### 1. Locations:

- a. Exterior door heads.
- b. Window heads and sills.
- c. Storefront heads.
- d. Horizontal control joints.
- e. Changes in veneer materials, vertically.
- f. Other wall openings.
- g. Other locations indicated.

### 2.11 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D 226M, Type 1 (No. 15 asphalt felt).
- D. Weep/Cavity Vent Products:
  1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
  2. Products
    - a. Basis of Design: Hohmann & Barnard QV Quadro Vent full mortar joint height  
Color to match mortar
    - b. Or approved equal.
- E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
  1. Configuration: Provide one of the following:
    - a. Strips, full depth of cavity and 10 inches high with dovetail-shaped notches 7 inches deep that prevent clogging with mortar droppings.
    - b. Strips, not less than 3/4 inch thick and 10 inches high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.
    - c. Sheets or strips, full depth of cavity and installed to full height of cavity.



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- F. Exterior Wall Expansion Joint Covers: Provide pre-manufactured silicone-coated, precompressed primary seal assembly at all exterior expansion joints.
  
- G. Products: Subject to compliance with requirements, provide one of the following or approved equal:
  - 1. Plastic Weep Hole/Vent:
    - a. Cell Vent; Dur-O-Wal, Inc.
    - b. Or Approved Equal
  
  - 2. Cavity Drainage Material:
    - a. Mortar Break; Advanced Building Products, Inc.
    - b. CavClear Masonry Mat; CavClear.
    - c. Mortar Net; Mortar Net USA, Ltd.
    - d. Mortar Stop; Polytite Manufacturing Corp.
    - e. Or Approved Equal
  
  - 3. Reinforcing Bar Positioners:
    - a. #RB Rebar Positioner; Hohmann & Barnard, Inc.
    - b. #RB-Twin Rebar Positioner; Hohmann & Barnard, Inc.
    - c. Or Approved Equal
  
  - 4. Exterior Wall Expansion Joint Cover:
    - a. Seismic Colorseal; EMSEAL LLC.
    - b. Or Approved Equal

### 2.12 CAVITY-WALL INSULATION

- A. Continuous Insulation Xci foil wall panels: Comply with NFPA 285 exterior wall assembly and ASTM C1289. Panels are a high thermal resistive rigid insulation panel composed of a closed cell Polyisocyanurate foam core bonded to an impermeable foil facer. Provide type: ASTM C1289, type 1 Grade (3) = 25 PSI thickness 1.5 inches (38 mm)/R-value 10.0. Provide panel fasteners that are corrosive resistant with length and embedment as recommended by panel manufacturer.
  
- B. Basis of Design Product: Hunter Panels Xci Foil. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

### 2.13 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.
  
- B. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without

## SECTION 04810 - UNIT MASONRY ASSEMBLIES

discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Available Products: Subject to compliance with requirements, products that may be used to clean unit masonry surfaces include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following or approved equal:
  - a. Cleaners for Red and Light-Colored Brick Not Subject to Metallic Staining with Mortar Not Subject to Bleaching:
    - 1) 202 New Masonry Detergent; Diedrich Technologies, Inc.
    - 2) Sure Klean No. 600 Detergent; ProSoCo, Inc.
    - 3) Florok 700 Masonry Detergent; Chargar Corporation.
  - b. Cleaners for Red and Dark-Colored Brick Not Subject to Metallic Staining:
    - 1) 200 Lime Solv; Diedrich Technologies, Inc.
    - 2) Sure Klean No. 101 Lime Solvent; ProSoCo., Inc.
    - 3) Chargar Corporation.
  - c. Cleaners for Brick Subject to Metallic Staining:
    - 1) 202V Vana-Stop; Diedrich Technologies, Inc.
    - 2) Sure Klean Vana Trol; ProSoCo, Inc.
    - 3) Chargar Corporation.

### 2.14 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
  1. Do not use calcium chloride in mortar or grout.
  2. Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a pre-blended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification.
  1. Extended-Life Mortar for Unit Masonry: Mortar complying with ASTM C 1142 may be used instead of mortar specified above, at Contractor's option.
  2. Limit cementitious materials in mortar for exterior and reinforced] masonry to portland cement, mortar cement, and lime.
  3. For masonry below grade, in contact with earth, and where indicated, use Type S.
  4. For reinforced masonry and where indicated, use Type S.
  5. For exterior ,vener brick use Type N.

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- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
1. Pigments shall not exceed 10 percent of Portland cement by weight
  2. Mix to match Architect's sample.
  3. Application: Use pigmented mortar for exposed mortar joints with the following units:
    - a. Clay face brick.
- E. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type fine that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
  2. Self-consolidated grout where indicated (SCG): ASTM C476 fine grout, pre-batched, pre-bagged, dry ingredients ready for hydration at the project site. Site proportioned grout will be rejected.
    - a. Specified minimum 28-day compressive strength is 3000 psi (ASTM C1019);
    - b. Slump flow (ASTM C1611) 24 inches to 28 inches;
    - c. T50 = 2 to 5 seconds
    - d. Visual Stability Index (VSI) = 0;
    - e. Basis of Design: SPEC MIX SCG, or approved equal.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
  2. Verify that foundations are within tolerances specified.
  3. Verify that reinforcing dowels are properly placed.
  4. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

### 3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.

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- D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
  - 1. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- G. Wetting of Brick: Wet brick before laying if the initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at the time of laying.

### 3.3 TOLERANCES

- A. Dimensions and Locations of Elements: or minus 1/4 inch (6 mm).
  - 1. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
  - 2. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch total.
- B. Lines and Levels:
  - 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
  - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet or 1/2 inch maximum.
  - 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet or 1/2 inch maximum.
  - 4. For conspicuous vertical lines, such as external corners, door jambs, reveals and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet or 1/2 inch maximum.
  - 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet in, 3/8 inch in 20 feet or 1/2 inch maximum.
  - 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2 inch maximum.
  - 7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.
- C. Joints:
  - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3mm), with a maximum thickness limited to 1/2 inch.
  - 2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.

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3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joints and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from straight line by more than 1/16 inch from one masonry unit to the next.

### 3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
  1. One-half running bond with vertical joint in each course centered on units in courses above and below.
  2. Stack bond.
  3. One-third running bond.
  4. As indicated on Drawings.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- F. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.
- G. 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.
- H. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.
  1. Install compressible filler in joint between top of partition and underside of structure above.

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2. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
3. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Firestopping."

### 3.5 MORTAR BEDDING AND JOINTING

#### A. Lay CMU as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with grout at anchors and ties as needed to fully embed anchors and ties in mortar.

#### B. Lay solid masonry units and hollow brick with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

#### C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.
4. Rake out mortar joints for pointing with sealant.

#### D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

#### E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

#### F. Cut joints flush where indicated to receive waterproofing, cavity wall insulation and air barriers unless otherwise indicated.

### 3.6 BONDING OF MULTI-WYTHE MASONRY

#### A. Use bonding system indicated on Drawings.

#### B. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.

1. Provide continuity with masonry joint reinforcement at corners by using prefabricated "L" units as well as masonry bonding.

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- C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

- 1. Provide continuity with masonry joint reinforcement by using prefabricated "T" units.

### 3.7 CAVITY WALLS

- A. Bond wythes of cavity walls together as follows:

- 1. Individual Metal Ties as indicated on drawings: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 1.77 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties around openings and space as indicated around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

- a. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) ties.
- b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) ties to allow for differential movement regardless of whether bed joints align.

- 2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.

- a. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement.
- b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) reinforcement to allow for differential movement regardless of whether bed joints align.

- 3. Masonry-Veneer Anchors: Comply with requirements for anchoring masonry veneers.

- B. Bond wythes of cavity walls together using bonding system indicated on drawings.

- C. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity. Provide clean out units (CMU or clay facing) every other unit for the length of the work. Remove accumulated mortar at completion of each lift of work. Install cleanout unit after top of masonry is completed.

- D. Parge all cavity face of backup wythe in a single coat to match existing (approximately 1/2 inch (10 mm)) thick. Trowel face of parge coat smooth to match existing and as required by the air barrier manufacturer.

### 3.8 ANCHORED MASONRY VENEERS

- A. Anchor masonry veneers to wall framing and structural steel and masonry backup with masonry-veneer anchors to comply with the following requirements:

- 1. Fasten fastener-attached anchors through sheathing to wall framing and to masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.

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2. Embed tie sections in masonry joints.
  3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
  4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally, with not less than one anchor for each 1.77 sq. ft. of wall area. Install additional anchors around openings and at intervals, not exceeding 8 inches, around perimeter and as indicated.
- B. Provide not less than 1 inch of airspace between back of masonry veneer and face of insulation.
1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace. Provide clean out units (CMU or clay facing) every other unit for the length of the work. Remove accumulated mortar at completion of each lift of work. Install cleanout unit after top of masonry is completed.

### 3.9 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement at minimum of 6 inches.
1. Space reinforcement not more than 16 inches o.c.
  2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
  3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Install brick masonry joint reinforcement at heads and sills of openings in brick veneer as indicated. Coordinate bed joint locations with adjustable anchor/ties. Do not install joint reinforcement in the same bed joint as the anchor/ties.

### 3.10 ANCHORING MASONRY TO STRUCTURAL STEEL

- A. Anchor masonry to structural steel, where masonry abuts or faces structural steel or concrete, to comply with the following:
1. Provide an open space not less than 1 inch wide between masonry and structural steel unless otherwise indicated. Keep open space free of mortar and other rigid materials.
  2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
  3. Space anchors as indicated.



## SECTION 04810 - UNIT MASONRY ASSEMBLIES

### 3.11 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
  - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
  - 2. Install preformed control-joint gaskets designed to fit standard sash block.
  - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
  - 4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.
- C. Form expansion joints in brick as follows:
  - 1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade at junctures with horizontal expansion joints if any.
  - 2. Build flanges of factory-fabricated, expansion-joint units into masonry.
  - 3. Build in compressible joint fillers where indicated.
  - 4. Form open joint full depth of brick wythe and of width indicated, but not less than 1/2 inch for installation of sealant and backer rod.
- D. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod but not less than 1/2 inch.
  - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

### 3.12 LINTELS

- A. Install galvanized steel lintels where indicated.
- B. Provide concrete or masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches for block-size units shown without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

### 3.13 FLASHING, WEEP HOLES, WATERPROOFING AND CAVITY VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:

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1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, and tape as recommended by flashing manufacturer.
  2. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing or masonry backup in accordance with barrier system manufacturer requirements at least 8 inches; with upper edge tied into water-resistive barrier, lapping at least 6 inches. Fasten upper edge of flexible flashing to sheathing through termination bar. Provide cut off sealant above termination bar to CMU.
  3. At lintels and shelf angles, extend flashing at minimum of 6 inches into masonry at each end. At heads and sills, extend flashing a minimum of 6 inches at ends and turn up not less than 2 inches to form end dams at nearest head joint.
  4. Install metal drip plates beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to tope of metal drip plate.
  5. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to tope of metal flashing termination.
  6. Provide minimum of 3 inches lap into drip plate. Set drip plate in continuous bed of butyl sealant. Set butyl on grouted solid brick course.
  7. Install continuous self-adhering base of wall waterproofing flush to exterior surface of trench foundation wall, extend horizontally inward to intersecting masonry wall and rise to the underside of through wall flashing location, terminate with termination bar to CMU wall, prime surfaces as required by approved manufacturer to provide complete adhesion.
- C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- D. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
1. Use specified weep/cavity vent products to form weep holes.

### 3.14 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie and support forms to maintain position and shape during construction and curing of reinforced masonry.
  2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

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1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

### 3.15 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform test and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- C. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

### 3.16 REPAIRING, POINTING AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes and completely fill with mortar. Point up joints, including corners, openings and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  5. Clean brick by bucket-and-brush hand-cleaning method.
  6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
  7. Clean masonry with a proprietary acidic cleaner applied according to the manufacturer's written instructions.
  8. Clean stone trim to comply with stone supplier's written instructions.
  9. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook".

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3.17 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excel masonry materials are Contractor's property. At completion of unit masonry work, remove from project site.
- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used, as described above or recycled, and other masonry waste and legally dispose of off Owner's property.

END OF SECTION 04810

## SECTION 05120 - 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 SUMMARY

- A. This Section includes structural steel.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Engineer structural steel connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated.
- B. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for structural steel connections.

#### 1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.
- C. Shop Drawings detailing fabrication of structural steel components.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
  - 3. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.
  - 4. Include Shop Drawings signed and sealed by a qualified professional engineer responsible for their preparation.
- D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Mill test reports signed by manufacturers certifying that their products, including the following, comply with requirements.
  - 1. Structural steel, including chemical and physical properties.

## SECTION 05120 - STRUCTURAL STEEL

2. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
3. Direct-tension indicators.
4. Shop primers.
5. Nonshrink grout.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.
- C. Comply with applicable provisions of the following specifications and documents:
  1. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
  2. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
  3. AISC's "Seismic Provisions for Structural Steel Buildings."
  4. ASTM A 6 (ASTM A 6M) "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."
  5. Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.
- E. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel."
  1. Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

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1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
2. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

### 1.7 SEQUENCING

- A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

## PART 2 - PRODUCTS

### 2.1 MATERIALS AS INDICATED.

- A. Structural Steel Shapes, Plates, and Bars: As follows:
  1. Carbon Steel: ASTM A 36.
  2. High-Strength, Low-Alloy Columbium-Vanadium Steel: ASTM A 992, Grade 50.
  3. High-Strength, Low-Alloy Structural Steel: ASTM A 588, Grade 50, corrosion resistant.
- B. Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B.
- C. Hot-Formed Structural Steel Tubing: ASTM A 501.
- D. Steel Pipe: ASTM A 53, Type E or S, Grade B.
  1. Weight Class: Standard unless indicated otherwise.
  2. Finish: Black, except where indicated to be galvanized.
- E. Carbon-Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.
- F. High-Strength Steel Castings: ASTM A 148, Grade 80-50.
- G. Shear Connectors: ASTM A 108, Grade 1015 through 1020, headed-stud type, cold-finished carbon steel, AWS D1.1, Type B.
- H. Anchor Rods, Bolts, Nuts, and Washers: As follows:
  1. Unheaded Rods: ASTM A 36.
  2. Headed Bolts: ASTM A 307, Grade A; carbon-steel, hex-head bolts; and carbon-steel nuts.
  3. Headed Bolts: ASTM A 325, Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts. Use where high strength bolts are indicated.
  4. Washers: ASTM A 36.

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- I. Nonhigh-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A; carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers.
  - 1. Finish: Hot-dip zinc-coating, ASTM A 153, Class C.
- J. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
  - 1. Finish: Hot-dip zinc-coating, ASTM A 153, Class C.
- K. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
  - 1. Finish: Mechanically deposited zinc coating.
- L. Welding Electrodes: Comply with AWS requirements.

### 2.2 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds and repair painting galvanized steel, with dry film containing not less than 93 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20.

### 2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

### 2.4 FABRICATION

- A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.
  - 1. Camber structural steel members where indicated.
  - 2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until steel has been erected.
  - 3. Mark and match-mark materials for field assembly.
  - 4. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
  - 5. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.
  - 6. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.



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- B. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust, scale, seam marks, roller marks, rolled trade names and roughness.
  - 1. Remove blemishes by filling or grinding, or by welding and grinding, prior to cleaning, treating, and shop priming.
  - 2. Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded.
- D. Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.
- E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's printed instructions.
- F. Holes: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on Shop Drawings.
  - 1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

### 2.5 SHOP CONNECTIONS

- A. Shop install and tighten high-strength bolts according to RCSC's Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
  - 1. Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated.
  - 2. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.
- B. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
  - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
  - 2. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

### 2.6 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:

## SECTION 05120 - STRUCTURAL STEEL

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  2. Surfaces to be field welded.
  3. Surfaces to be high-strength bolted with slip-critical connections.
  4. Surfaces to receive sprayed-on fireproofing.
  5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:
1. SPC-SP 3 "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  2. Apply 2 coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Apply a 1-coat, nonasphaltic primer complying with SSPC's "Painting System Guide No. 7.00" to provide a dry film thickness of not less than 1.5 mils.

### 2.7 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated for galvanizing according to ASTM A 123.

### 2.8 SOURCE QUALITY CONTROL

- A. The Contractor will employ and pay for an independent testing and inspecting agency to perform shop inspections and tests and to prepare test reports.
1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
  2. Provide testing agency with access to places where structural steel Work is being fabricated or produced so required inspection and testing can be accomplished.
- B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.
- C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- D. Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
1. Direct-tension indicator gaps will be verified to comply with ASTM F 959, Table 2.

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- E. In addition to visual inspection, shop-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.
  - 1. Liquid Penetrant Inspection: ASTM E 165.
  - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.
- B. Do not proceed with erection until unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.
  - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

#### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.
- B. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
  - 1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
  - 3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
    - a. Comply with manufacturer's instructions for proprietary grout materials.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

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1. Maintain erection tolerances of architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  1. Level and plumb individual members of structure.
  2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- E. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- F. Do not use thermal cutting during erection.
- G. Finish sections thermally cut during erection equal to a sheared appearance.
- H. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

### 3.4 FIELD CONNECTIONS

- A. Install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.
- B. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
  1. Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated.
  2. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.
- C. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
  1. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
  2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
  3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

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### 3.5 FIELD QUALITY CONTROL

- A. Owner will employ and pay for an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports.
  - 1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.
- B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.
- C. Additional testing will be performed to determine compliance of corrected Work with specified requirements. Contractor will reimburse Owner for the costs of these additional tests.
- D. Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
  - 1. Direct-tension indicator gaps will be verified to comply with ASTM F 959, Table 2.
- E. In addition to visual inspection, field-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.
  - 1. Liquid Penetrant Inspection: ASTM E 165.
  - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

### 3.6 CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
  - 1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A 780.

END OF SECTION 05120



## SECTION 05125 – ARCHITECTURALLY EXPOSED 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 SUMMARY

- A. This Section includes requirements regarding the appearance and surface preparation of Architecturally Exposed Structural Steel (AESS).

Refer to Division 5, Section ‘Structural Steel’ for all other requirements regarding steel work not included in this section.

This section applies to any members noted on Architectural [and Structural] drawings as AESS [and in the areas defined as AESS below].

#### 1.3 SUBMITTALS

- A. General: Submit each item below according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.
- C. Shop Drawings detailing fabrication of AESS components.
  - 1. Provide erection drawings clearly indicating which members are considered as AESS members.
  - 2. Include details that clearly identify all of the requirements listed in sections 2.3 “Fabrication” and 3.3 “Erection” of this specification. Provide connections for exposed AESS consistent with concepts shown on the architectural or structural drawings.
  - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined herein.
  - 4. Indicate type, size, finish and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tensioned shear/bearing connections. [Indicate to which direction bolt heads should be oriented.]
  - 5. Clearly indicate which surfaces or edges are exposed and what class of surface preparation is being used.

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6. Indicate special tolerances and erection requirements as noted on the drawings or defined herein.

Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified. Submit photographs showing detail of installed AESS.

### 1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: In addition to those qualifications listed in Division 5 Section 'Structural Steel,' engage a firm experienced in fabricating AESS similar to that indicated for this Project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying work.
- B. Erector Qualifications: In addition to those qualifications listed in Division 5 Section 'Structural Steel,' engage an experienced Erector who has completed AESS work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- C. Comply with applicable provisions of the following specifications and documents:
  1. AISC "Code of Standard Practice," latest edition, Section 10 as amended herein.
- D. Mockups: At least four weeks prior to fabricating AESS, the contractor shall construct mockups to demonstrate aesthetic effects as well as qualities of materials and execution. A mockup for each of the following elements shall be constructed (both stairs, hand railings and guard railings):
  1. Mockup #1: Stair #1 typical stringer.
  2. Mockup #2: Stair #2 Lobby Stair – bent stringer.
    - a. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.
      - 1) Locate mockups on-site or in the fabricator's shop as directed by Architect. Mockups shall be full-size pieces unless the Architect approves smaller models.
      - 2) Notify the Architect one week in advance of the dates and times when mockups will be available for review.
      - 3) Demonstrate the proposed range of aesthetic effects regarding each element listed under the fabrication heading below.
      - 4) Mockup will have finished surface (including surface preparation and paint system).
      - 5) Obtain Architect's approval of mockups before starting fabrication of final units.
      - 6) Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
    - b. Approved mockups in an undisturbed condition at the time of Substantial completion may become part of the completed work.



## SECTION 05125 – ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

- E. Pre-installation Conference: The General Contractor shall schedule and conduct conference at the project site to comply with requirements of Division 1 Section “Project Meetings.” As a minimum, the meeting shall include the General Contractor, Fabricator, Erector, the finish-painting subcontractor, and the Architect. Coordinate requirements for shipping, special handling, attachment of safety cables and temporary erection bracing, touch up painting and other requirements for AESS.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver AESS to Project site in such quantities and at such times to ensure continuity of installation.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. Use special care in handling to prevent twisting or warping of AESS members.
- C. Erect pre-painted finish pieces using padded slings or other methods such that they are not damaged. Provide padding as required to protect while rigging and aligning member’s frames. Weld tabs for temporary bracing and safety cabling only at points concealed from view in the completed structure or where approved by the Architect during the pre-installation meeting. Methods of removing temporary erection devices and finishing the AESS members shall be approved by the Architect prior to erection.

### 1.6 PROJECT CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying work.

### 1.7 COORDINATION

- A. Coordinate installation of anchors for AESS members that connect to the work of other trades. Furnish setting drawings, templates, and directions for installing anchors, including sleeves, concrete insets, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to the project site in time for installation. [Anchorage concepts shall be as indicated on drawings and approved on final shop drawings.]

## PART 2 - PRODUCTS

### 2.1 MATERIALS AS INDICATED.

- A. General: Meet requirements Division 5 Section ‘Structural Steel’ as amended below

High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.

## SECTION 05125 – ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

Finish: Hot-dip zinc-coating, ASTM A 153, Class C.

### 2.2 PRIMERS AND FINISH

- A. Compatibility: The General Contractor shall submit all components/procedures of the paint system for AESS as a single coordinated submittal. As a minimum, identify required surface preparation, primer, intermediate coat and finish coat. All of the items shall be coordinated with the finish coat specified in Division 9
- B. Primer: Two coats of Carboline 825 high build epoxy. Primer shall comply with all federal standards for VOC, lead and chromate levels.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint for galvanizing welds and repair-painting galvanized steel, with dry-film coating not less than 90-percent zinc dust by weight.
- D. Finish: Two coats of Carboline 133 LH Urethane (White).

### 2.3 FABRICATION

- A. Fabricate and assemble AESS in the shop to the greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by the Architect. Detail AESS assemblies to minimize field handling and expedite erection.
- B. Fabricate AESS with exposed surfaces smooth, square and of surface quality consistent with approved mock up. Use special care in handling and shipping of AESS both before and after shop painting.
- C. In addition to special care used to handle and fabricate AESS, employ the following fabrication techniques.
  - 1. Fabrication Tolerance: Fabricate steel to one half the normal tolerance as specified in the *Code of Standard Practice* Section 10.
  - 2. Welds ground smooth: Fabricator shall grind welds of AESS smooth. For groove welds, the weld shall be made flush to the surfaces each side and be within +1/16", -0" of plate thickness.
  - 3. Contouring and blending of welds: Where fillet welds are indicated to be ground-contoured, or blended, oversize welds as required and grind to provide a smooth transition and to match profile on approved mock-up.
  - 4. Continuous Welds: Where welding is noted on the drawings, provide continuous welds of a uniform size and profile.
  - 5. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.

## SECTION 05125 – ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

6. Coping and Blocking Tolerance: Maintain a uniform gap of 1/8" +/- 1/32" at all copes and blocks.
7. Joint Gap Tolerance: Maintain a uniform gap of 1/8" +/- 1/32".
8. Piece Marks Hidden: Fabricate such that piece marks are fully hidden in the final structure or made with such media to permit full removal after erection.
9. Mill Mark Removal: Fabricator shall deliver steel with no mill marks (stenciled, stamped, raised etc) in exposed locations. Mill marks shall be omitted by cutting of mill material to appropriate lengths where possible. Where not possible, the fabricator can fill and/or grind to a surface finish consistent with the approved mock up.
10. Grinding of sheared edges: Fabricator shall grind all edges of sheared, punched or flame-cut steel to match approved mockup.
11. Rolled Members: Member specified to be rolled to a final curved shape shall be fully shaped in the shop and tied during shipping to prevent stress relieving. Distortion of the web or stem, and of outstanding flanges or legs of angles shall be visibly acceptable to the Architect for a distance of 20' under any lighting condition determined by the Architect. Tolerances for the vertical and horizontal walls of rectangular HSS members after rolling shall be the specified dimension +/- 1/2".
12. Seal weld open ends of round and rectangular hollow structural section with 3/8" closure plates. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.

### 2.4 SHOP CONNECTIONS

- A. Bolted Connections: Make in accordance with Section 05120. Provide bolt type and finish as noted herein and align bolt heads as indicated on the approved shop erection drawings.
- B. Weld Connections: Comply with AWS D1.1 and Section 05120. Appearance and quality of welds shall be consistent with the mock up. Assemble and weld built-up sections by methods that will maintain alignment of members without warp exceeding the tolerance of this section.

### 2.5 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
  1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  2. Surfaces to be field welded.
  3. Surfaces to be high-strength bolted with slip-critical connections, if primer does not meet the specified AISC slip coefficient.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:

## SECTION 05125 – ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

1. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions to provide a dry film thickness of not less than 1.5 mils (0.038mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  2. Apply 2 coats of shop primer to surfaces that are inaccessible after assembly or erection.

### 2.6 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to AESS indicated for galvanizing according to ASTM A 123. Fabricate such that all connections of assemblies are made in the field with bolted connections. Provide galvanized finish on members and assemblies within the range of color and surface textures presented in the mock ups.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. The erector shall check all AESS members upon delivery for twist, kinks, gouges or other imperfections which might result in rejection of the appearance of the member. Coordinate remedial action with fabricator prior to erecting steel.

### 3.2 PREPARATION

- A. Provide connections for temporary shoring, bracing and supports only where noted on the approved shop drawings. Temporary connections not shown shall be made at locations not exposed to view in the final structure or as approved by the Architect. Handle, lift and align pieces using padded slings and/or other protection required to maintain the appearance of the AESS through the process of erection.

### 3.2 ERECTION

- A. Set AESS accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.
- B. In addition to the special care used to handle and erect AESS, employ the following erection techniques:
  1. AESS Erection Tolerances: Erection Tolerances shall meet the requirements of Chapter 10 of the AISC *Code of Standard Practice*.

## SECTION 05125 – ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

2. Welds ground smooth: Erector shall grind welds smooth in the connections of AESS members. For groove welds, the weld shall be made flush to the surfaces of each side and be within + 1/16", -0" of plate thickness.
  3. Contouring and blending of welds: Where fillet welds are indicated to be ground contoured, or blended, oversize welds as required; grind to provide a smooth transition and to match profile on approved mock-up.
  4. Continuous Welds: Where noted on the drawings, provide continuous welds of a uniform size and profile.
  5. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.
  6. Bolt Head Orientation: All bolt heads shall be oriented as indicated on the contract documents. Where bolt-head alignment is specified, the orientation shall be noted for each connection on the erection drawings. Where not noted, the bolt heads in a given connection shall be oriented to one side.
  7. Removal of field connection aids: Run-out tabs, erection bolts and other steel members added to connections to allow for alignment, fit-up, and welding in the field shall be removed from the structure. Field groove welds shall be selected to eliminate the need for backing bars or to permit their removal after welding. Welds at run-out tabs shall be removed to match adjacent surfaces and ground smooth. Holes for erection bolts shall be plug welded and ground smooth.
  8. Filling of weld access holes: Where holes must be cut in the web at the intersection with flanges on W shapes and structural tees to permit field welding of the flanges, they shall be filled. Filling shall be executed with proper procedures to minimize restraint and address thermal stresses in group 4 and 5 shapes.
- C. Field Welding: Weld profile, quality, and finish shall be consistent with mock-ups approved prior to fabrication.
- D. Splice members only where indicated
- E. Obtain permission for any torch cutting or field fabrication from the Architect. Finish sections thermally cut during erection to a surface appearance consistent with the mock up.
- F. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection plates that are misaligned where holes cannot be aligned

### 3.3 FIELD CONNECTIONS

- A. Bolted Connections: Install bolts of the specified type and finish in accordance with Division 5 section "Structural Steel."
- B. Welded Connections: Comply with AWS D1.1 for procedures, and appearance. Refer to Division 5 section "Structural Steel" for other requirements.

## SECTION 05125 – ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp. Verify that weld sizes, fabrication sequence, and equipment used for AESS will limit distortions to allowable tolerances.
2. Obtain Architects approval for appearance of welds in repaired or field modified work.

### 3.4 FIELD QUALITY CONTROL

- A. Structural requirements: The Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports. Refer to Division 5 section “Structural Steel” for detailed bolt and weld testing requirements.
- B. AESS acceptance: The Architect shall observe the AESS steel in place and determine acceptability based on the mockup. The Testing Agency shall have no responsibility for enforcing the requirements of this section.

### 3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint shall be completed to blend with the adjacent surfaces of AESS. Such touch up work shall be done in accordance with manufacturer’s instructions as specified in Division 9, Section “Painting.”
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

END OF SECTION 05125

## SECTION 05210 - STEEL JOISTS

### 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 the following:
  - 1. Open-web K-series steel joists where indicated
  - 2. Joist accessories.

#### 1.3 DEFINITIONS

- A. Special Joists: Joists requiring modification by the manufacturer to support nonuniform, unequal, or special loading conditions that invalidate SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders."

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide special joists and connections capable of withstanding the following design loads within limits and under conditions indicated:
  - 1. Design Loads: As indicated on the Structural Drawings
- B. Design joists to withstand design loads with total load deflections no greater than the following:
  - 1. Roof Joists: Vertical live load deflection of  $1/360$  of the span.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product indicated.
- B. Shop Drawings: Show layout, mark, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, accessories; splice and connection locations and details; and attachments to other construction.

## SECTION 05210 - STEEL JOISTS

1. Indicate locations and details of anchorage devices and bearing plates to be embedded in other construction.
  2. Comprehensive engineering analysis signed and sealed by the qualified professional engineer responsible for its preparation when required.
- C. Welding Certificates: Copies of certificates for welding procedures and personnel.
- D. Mill certificates signed by manufacturers of bolts certifying that their products comply with specified requirements.
- E. 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 architects and owners, and other information specified.
- F. Research/Evaluation Reports: Evidence of steel joists' compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing joists similar to those indicated for this Project and with a record of successful in-service performance.
1. Manufacturer must be certified by SJI to manufacture joists complying with SJI standard specifications and load tables.
  2. Assumes responsibility for engineering special joists to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
  3. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of joists that are similar to those indicated for this Project in material, design, and extent.
- B. SJI Specifications: Comply with SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders" (hereafter, "Specifications"), applicable to types of joists indicated.
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel"; and AWS D1.3 "Structural Welding Code--Sheet Steel."

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.



## SECTION 05210 - STEEL JOISTS

### 1.8 SEQUENCING

- A. Deliver steel bearing plates and other devices to be built into concrete and masonry construction.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Steel: Comply with SJI's "Specifications" for chord and web members.
- B. Steel Bearing Plates: ASTM A 36/A 36M.
- C. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
  - 1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- D. Welding Electrodes: Comply with AWS standards.
- E. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

### 2.2 PRIMERS

- A. Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer with good resistance to normal atmospheric corrosion, complying with performance requirements in FS TT-P-664.

### 2.3 OPEN-WEB K-SERIES STEEL JOISTS

- A. Manufacture steel joists according to "Standard Specifications for Open Web Steel Joists, K-Series," in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord; of joist type indicated.
  - 1. Joist Type: K and KCS-series steel joists.
- B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- C. Provide holes in chord members for connecting and securing other construction to joists.
- D. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."
- E. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."

## SECTION 05210 - STEEL JOISTS

- F. Camber joists according to SJI's "Specifications", as required.
- G. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

### 2.5 JOIST ACCESSORIES

- A. Retain one of three paragraphs below. Bridging refers to permanent bridging.
- B. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span.
- C. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications."
- D. Bridging: Fabricate as indicated and according to SJI's "Specifications."
  - 1. Furnish additional erection bridging if required.
- E. Fabricate steel bearing plates with integral anchorages of sizes and thicknesses indicated. Hot-dip zinc coat according to ASTM A 123/A 123M.
- F. Steel bearing plates with integral anchorages are specified in Division 5 Section "Metal Fabrications."
- G. Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.
- H. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

### 2.6 CLEANING AND SHOP PAINTING

- A. Retain this Article if shop cleaning and priming are required.
- B. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories to be primed by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- C. Do not prime paint joists and accessories to receive sprayed fire-resistive materials].
- D. Apply one shop coat of primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.
- E. Painting of joists and joist accessories is specified in Division 9 Section "Painting."

## SECTION 05210 - STEEL JOISTS

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
  - 1. Before installation, splice joists delivered to Project site in more than one piece.
  - 2. Space, adjust, and align joists accurately in location before permanently fastening.
  - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
  - 4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads have been applied.
- C. Field weld joists to supporting steel bearing plates. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using carbon-steel bolts, unless otherwise indicated.
- E. Bolt joists to supporting steel framework using high-strength structural bolts, unless otherwise indicated. Comply with RCSC's "Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

#### 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner shall employ and pay for a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Field welds will be visually inspected according to AWS D1.1.

## SECTION 05210 - STEEL JOISTS

- C. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following procedures, as applicable:
  - 1. Magnetic Particle Inspection: ASTM E 709.
  - 2. Liquid Penetrant Inspection: ASTM E 165.
- D. Bolted connections will be visually inspected.
  - 1. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."
- E. Correct deficiencies in Work that inspections and test reports have indicated are not in compliance with specified requirements.
- F. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

### 3.4 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates and abutting structural steel.
  - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
  - 2. Apply a compatible primer of the same type as the shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 9 Section "Painting."
- D. Provide final protection and maintain conditions, in a manner acceptable to manufacturer, Installer and Engineer that ensure joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 05210

## SECTION 05310 - STEEL DECK

### 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 the following:

- 1. Roof deck when indicated.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.
- C. Product Certificates: Signed by steel deck manufacturers certifying that products furnished comply with requirements.
- D. Welding Certificates: Copies of certificates for welding procedures and personnel.
- E. Product Test Reports: From a qualified testing agency indicating that each of the following complies with requirements, based on comprehensive testing of current products:
  - 1. Mechanical fasteners.
- F. Research/Evaluation Reports: Evidence of steel deck's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed steel deck 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. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

## SECTION 05310 - STEEL DECK

- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
  - D. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those steel deck units tested for fire resistance per ASTM E 119 by a testing and inspection agency acceptable to authorities having jurisdiction.
    - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
    - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
  - E. AISI Specifications: Calculate structural characteristics of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members."
  - F. FM Listing: Provide steel roof deck evaluated by FM and listed in FM's "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
  - B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
- 1.6 COORDINATION
- A. Coordinate installation of sound-absorbing insulation strips in topside ribs of acoustical deck with roofing installation specified in Division 7 to ensure protection of insulation strips against damage from effects of weather and other causes.
  - B. Coordinate layout and installation of trench headers, preset inserts, duct fittings, and other components specified in Division 16 Section "Underfloor Raceway" with installation of cellular metal floor deck.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

## SECTION 05310 - STEEL DECK

1. Steel Deck:
  - a. BHP Steel Building Products USA Inc.
  - b. Consolidated Systems, Inc.
  - c. Epic Metals Corp.
  - d. Marlyn Steel Products, Inc.
  - e. Nucor Corp.; Vulcraft Div.
  - f. Roof Deck, Inc.
  - g. United Steel Deck, Inc.
  - h. Verco Manufacturing Co.
  - i. Wheeling Corrugating Co.; Div. of Wheeling-Pittsburgh Steel Corp.

### 2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 29, and the following:
  1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
  2. Deck Profile: As Indicated.
  3. Profile Depth: As indicated
  4. Design Uncoated-Steel Thickness: As indicated
  5. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated
  6. Span Condition: As indicated.
  7. Side Laps: As indicated

### 2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Steel Sheet Accessories: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

## SECTION 05310 - STEEL DECK

- G. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 29 for overhang and slab depth.
- H. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- I. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- J. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, .0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- K. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch- wide flanges and recessed pans of 1-1/2- inch minimum depth. For drains, cut holes in the field.
- L. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- M. Shear Connectors: ASTM A 108, Grades 1010 through 1020 headed stud type, cold-finished carbon steel, AWS D1.1, Type B, with arc shields.
- N. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- O. Repair Paint: Lead- and chromate-free rust-inhibitive primer complying with performance requirements of FS TT-P-664.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

### 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 29, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate decking bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.



## SECTION 05310 - STEEL DECK

1. Align cellular deck panels for entire length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to decking.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

### 3.3 ROOF DECK INSTALLATION

- A. Fasten roof deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter, but not less than 1-1/2 inches long, and as follows:
  1. Weld Diameter: 5/8 inch nominal.
  2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated.
  3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated, and as follows
  1. Mechanically fasten with self-drilling No. 10 diameter or larger carbon-steel screws.
  2. Mechanically clinch or button punch.
  3. Fasten with a minimum of 1-1/2-inch- long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
  1. End Joints: Lapped 2 inches minimum
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking and weld flanges to top of deck. Space welds not more than 12 inches apart with at least 1 weld at each corner.
- E. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

## SECTION 05310 - STEEL DECK

- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.
- G. Sound-Absorbing Insulation: Installation into topside ribs of deck as specified in Division 7 .

### 3.4 FIELD QUALITY CONTROL

- A. Testing: Owner shall employ and pay for a qualified independent testing agency to perform field quality-control testing.
- B. Field welds will be subject to inspection.
- C. Shear connector stud welds will be inspected and tested according to AWS D1.1 for stud welding and as follows:
  - 1. Shear connector stud welds will be visually inspected.
  - 2. Bend tests will be performed if visual inspections reveal less than a full 360-degree flash or welding repairs to any shear connector stud.
  - 3. Tests will be conducted on additional shear connector studs if weld fracture occurs on shear connector studs already tested according to AWS D1.1.
- D. Testing agency will report test results promptly and in writing to Contractor and Architect.
- E. Remove and replace work that does not comply with specified requirements.
- F. Additional testing and inspecting will be performed to determine compliance of corrected work with specified requirements. Contractor will reimburse Owner for the costs of these additional tests.

### 3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05310

## SECTION 05510 - METAL LADDERS

### A. General:

1. Comply with ANSI A14.3[, except for elevator pit ladders].
2. For elevator pit ladders, comply with ASME A17.1/CSA B44.

### B. Steel Ladders:

1. Space siderails 18 inches.
2. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 1-inch- square steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.
7. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 3/4 inch in least dimension.
8. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets. Provide a minimum 7" clear from the face of rung to the nearest obstruction for clear toe room.
9. The finish for all ladders shall be hot-dipped Galvanized steel painted in accordance with Specification Section 09900 Painting.
10. In Stairs A & B, provide the roof ladders with hinged security doors and a hasp lock to prevent pedestrians from using the ladders.

END OF SECTION



## SECTION 05810 – EXPANSION JOINT COVER ASSEMBLIES

### 1.1 GENERAL

- A. Submittals: Submit the following according to Conditions of the Contract and Division 1.
  - 1. Product data including specifications, installation instructions, details, profiles, and finishes.
- B. Fire-Resistance Ratings: Not less than the rating of adjacent construction. See drawings for fire rating requirements.
- C. For exterior expansion joints, refer to the drawings and specification section 04810.

### 1.2 PRODUCTS

- A. Available Manufacturers or approved equal: Subject to compliance with requirements.
  - 1. American Permaquik, Inc.
  - 2. Architectural Art Mfg., Inc.
  - 3. Balco, Inc.
  - 4. The D.S. Brown Co.
  - 5. Construction Specialties, Inc.
  - 6. D&B X-pansion Joints Inc.
  - 7. Emseal Joint Systems, Ltd.
  - 8. E-Poxy Industries, Inc.
  - 9. Erie Metal Specialties.
  - 10. Hydrozo/Jeene, Inc.
  - 11. Metalines, Inc.
  - 12. MM Systems Corp.
  - 13. Pawling Corp.
  - 14. Michael Rizza Co., Inc.
  - 15. Tremco, Inc.
  - 16. Watson Bowman Acme Corp.
- B. Extruded Preformed Seals: Single- or multicellular elastomeric profiles with or without continuous, longitudinal, and internal baffles.
- C. Preformed Sealant: Elastomeric sealant complying with ASTM C 920, Use T, factory-formed and -bonded to metal frames or anchor members.
- D. Seismic Seals: Two single-layered elastomeric profiles retained in frames at wide joints designed to withstand earthquake movement. At manufacturer's option, omit interior profile for interior application.
- E. Fire Barriers: Tested in maximum joint width condition per ANSI/UL 263, NFPA 251, U.B.C. 43-1, or ASTM E 119.
- F. Moisture Barrier: Continuous, flexible, vinyl moisture barrier under covers.
- G. Fire-Rated Joint Covers: With fire barrier seals to provide fire-resistive rating not less than the rating of adjacent construction.

## SECTION 05810 – EXPANSION JOINT COVER ASSEMBLIES

- H. Metal Floor-to-Floor Joint Cover Assemblies: Provide continuous, extruded, metal frames of profile indicated.
  - 1. Flexible Cover Plates: The cover plate to be attached to frame permitting free movement on both sides.
- I. Floor-to-Wall Joints: Frame on floor side only, unless wall side frame required by manufacturer.
  - 1. Angle Cover Plates: Attach angle cover plates to wall.
- J. Wall, Ceiling, and Soffit Joint Cover Assemblies: Provide expansion joint cover assemblies in intersecting planes of same appearance.
  - 1. Fixed Metal Cover Plates: Anchor frame on one side permitting free movement on other side.
- K. Compression Seals: Preformed, elastomeric extrusions having internal baffle system with lubricant and adhesive for installation.
- L. Stainless Steel Finishes: Comply with NAAMM "Metal Finishes Manual."
  - 1. Bright, Cold-Rolled Unpolished Finish: AISI No. 2B finish.

### 1.3 EXECUTION

- A. Preparation: Comply with these specifications and manufacturer's instructions and recommendations including preparation of substrate, applying materials, and protecting installed units.
- B. Coordinate and furnish anchorages, setting drawings, templates, and instructions for anchoring to concrete or forming recesses into concrete for placement and grouting frames.
- C. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required. Install in true alignment in relationship to established lines and levels. Allow adequate free movement for metal thermal expansion and contraction. Set floor covers flush with adjacent finished floor materials. Install wall, ceiling, roof, and soffit covers in continuous contact with adjacent surfaces.
- D. Extruded Preformed Seals: Install seals to comply with manufacturer's instructions and with minimum number of end joints.
- E. Seismic Seals: Install seals according to manufacturer's instructions.
- F. Fire Barriers: Install fire barriers, including transitions and end joints according to manufacturer's instructions so that fire-rated construction is continuous.
- G. Cleaning and Protection: Remove protective covering only after finish work in adjacent areas is complete. Clean exposed metal surfaces to comply with manufacturer's instructions.

END OF SECTION 05810

## SECTION 06100 - ROUGH CARPENTRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. This Section includes the following:

1. Wood framing.
2. Wood supports.
3. Wood blocking.
4. Wood cants.
5. Wood nailers.
6. Wood furring.
7. Wood grounds.
8. Wood sheathing.

#### 1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product indicated.

1. Include data for wood-preservative and fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that materials comply with requirements.

B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses.

C. Research/Evaluation Reports: For the following:

1. Treated wood.
2. Engineered wood products.
3. Foam-plastic sheathing.
4. Power-driven fasteners.
5. Powder-actuated fasteners.
6. Expansion anchors.
7. Metal framing anchors.
8. Building wrap.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

## SECTION 06100 - ROUGH CARPENTRY

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 manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

### 2.2 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
  1. Factory mark each piece of lumber with grade stamp of grading agency.
  2. For exposed lumber indicated to receive stained or natural finish, mark grade stamp on end or back of each piece.
  3. Provide dressed lumber, S4S, unless otherwise indicated.
  4. Provide dry lumber with 15 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
- B. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  1. Allowable Design Stresses: Meet or exceed those indicated per manufacturer's published values determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Wood Structural Panels:
  1. Plywood: DOC PS 1.
  2. Oriented Strand Board: DOC PS 2.
  3. Comply with "Code Plus" provisions in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial."

### 2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWA C2 (lumber) and AWWA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWWA C31 with inorganic boron (SBX). Preservative chemicals to be in accordance with EPA guidelines and regulations.
- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
- C. Mark each treated item with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:



## SECTION 06100 - ROUGH CARPENTRY

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing members less than 18 inches above grade.
4. Wood floor plates that are installed over concrete slabs directly in contact with earth.

### 2.4 DIMENSION LUMBER

- A. General: Of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.
- B. Non-Load-Bearing Interior Partitions: Construction, Stud, or No. 2 grade and any of the following species:
  1. Mixed southern pine; SPIB.
  2. Eastern softwoods; NELMA.
  3. Northern species; NLGA.
  4. Western woods; WCLIB or WWPA.
- C. Framing Other Than Non-Load-Bearing Partitions: Any species and grade with a modulus of elasticity of at least 1,300,000 psi and an extreme fiber stress in bending of at least 850 psi for 2-inch nominal thickness and 12-inch nominal width for single-member use.
- D. Exposed Framing: Hand select material for uniformity of appearance and freedom from characteristics that would impair finish appearance.
  1. Species and Grade: As indicated above for load-bearing construction of same type.
  2. Species and Grade: Hem-fir or Hem-fir (north), Select Structural grade; NLGA, WCLIB, or WWPA.
  3. Species and Grade: Southern pine, No. 1 grade; SPIB.
  4. Species and Grade: Spruce-pine-fir or Spruce-pine-fir (south), No. 1 grade; NELMA, NLGA, WCLIB, or WWPA.

### 2.5 TIMBER AND MISCELLANEOUS LUMBER

- A. For timbers of 5-inch nominal size and thicker, provide material complying with the following requirements:
  1. Species and Grade: Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south; No. 1 grade; NLGA, WCLIB, or WWPA.
  2. Species and Grade: Eastern hemlock, Eastern hemlock-tamarack, or Eastern hemlock-tamarack (north); No. 1 grade; NELMA or NLGA.
  3. Species and Grade: Southern pine, No. 1 grade; SPIB.
- B. Provide miscellaneous lumber for support or attachment of other construction, including the following:

## SECTION 06100 - ROUGH CARPENTRY

1. Rooftop equipment bases and support curbs.
  2. Blocking.
  3. Cants.
  4. Nailers.
  5. Furring.
  6. Grounds.
- C. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 15 percent maximum moisture content of any species.
- D. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine, No. 2 grade; SPIB.
  2. Eastern softwoods, No. 2 Common grade; NELMA.
  3. Northern species, No. 2 Common grade; NLGA.
  4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

### 2.6 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Composite of wood veneers with grain primarily parallel to member lengths, manufactured with exterior-type adhesive complying with ASTM D 2559. Allowable design values determined according to ASTM D 5456.
1. Available Manufacturers or approved equal:
    - a. Boise Cascade Corporation.
    - b. Georgia-Pacific Corporation.
    - c. Louisiana-Pacific Corporation.
    - d. Pacific Woodtech Corp.
    - e. Trus Joist MacMillan.
    - f. Union Camp Corp.; Building Products Division.
    - g. Willamette Industries, Inc.
  2. Extreme Fiber Stress in Bending, Edgewise: 2600 psi for 12-inch nominal- depth members.
  3. Modulus of Elasticity, Edgewise: 1,900,000 psi.
- B. Wood I-Joists: Prefabricated units complying with APA PRI-400; depths and performance ratings not less than those indicated.
1. Available Manufacturers or approved equal:
    - a. Boise Cascade Corporation.
    - b. Georgia-Pacific Corporation.
    - c. Louisiana-Pacific Corporation.
    - d. Pacific Woodtech Corp.
    - e. Superior Wood Systems, Inc.
    - f. Trus Joist MacMillan.

## SECTION 06100 - ROUGH CARPENTRY

- g. Union Camp Corp.; Building Products Division.
  - h. Willamette Industries, Inc.
2. Web Material: Either oriented strand board or plywood, Exposure 1.
  3. Structural Capacities: Establish and monitor structural capacities according to ASTM D 5055.
  4. Trademark: Factory mark I-joists with APA trademark indicating nominal joist depth, joist class, span ratings, mill identification, and I-joist compliance with APA standard.

### 2.7 SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural 2, Exposure 1 sheathing.

### 2.8 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch thick.

### 2.9 MISCELLANEOUS MATERIALS

- A. Fasteners:

1. Where rough carpentry is pressure treated, exposed to weather, in ground contact, or in areas of high relative humidity, provide fasteners with hot-dip galvanized coating complying with ASTM A 153, triple-zinc coated or made of Type 304 stainless steel.
2. Power-Driven Fasteners: CABO NER-272.
3. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

- B. Metal Framing Anchors: Made from hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

1. Available Manufacturers or approved equal:

- a. Alpine Engineered Products, Inc.
- b. Cleveland Steel Specialty Co.
- c. Harlen Metal Products, Inc.
- d. KC Metals Products, Inc.
- e. Silver Metal Products, Inc.
- f. Simpson Strong-Tie Company, Inc.
- g. Southeastern Metals Manufacturing Co., Inc.
- h. United Steel Products Company, Inc.

2. Research/Evaluation Reports: Provide products acceptable to authorities having jurisdiction and for which model code research/evaluation reports exist that show

## SECTION 06100 - ROUGH CARPENTRY

compliance of metal framing anchors, for application indicated, with building code in effect for Project.

3. Allowable Design Loads: Meet or exceed those indicated per manufacturer's published values determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Building Paper: Asphalt-saturated organic felt complying with ASTM D 226, Type I (No. 15 asphalt felt), unperforated.
- D. Sheathing Tape: Pressure-sensitive plastic tape for sealing joints and penetrations in sheathing and recommended by sheathing manufacturer for use with type of sheathing required.
- E. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.
- F. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01] ASTM D 3498 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturers.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Apply field treatment complying with AWWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- C. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  1. CABO NER-272 for power-driven fasteners.
  2. Published requirements of metal framing anchor manufacturer.
  3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in the Uniform Building Code.
  4. Table 2305.2, "Fastening Schedule," in the BOCA National Building Code.
  5. Table 2306.1, "Fastening Schedule," in the Standard Building Code.
  6. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in the International One- and Two-Family Dwelling Code.
- D. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

## SECTION 06100 - ROUGH CARPENTRY

- E. Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.
- F. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- G. Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.
  - 1. Comply with "Code Plus" provisions in above-referenced guide.
- H. Fastening Methods:
  - 1. Combination Subfloor-Underlayment: Glue and nail to wood framing.
  - 2. Subflooring: Glue and nail to wood framing.
  - 3. Sheathing: Nail to wood framing.
  - 4. Plywood Backing Panels: Nail or screw to supports.
- I. Apply building paper horizontally with 2-inch overlap and 6-inch end lap; fasten to sheathing with galvanized staples or roofing nails. Cover upstanding flashing with 4-inch overlap.
- J. Apply sheathing tape to joints between sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

END OF SECTION 06100



## SECTION 06176 - METAL-PLATE-CONNECTED WOOD TRUSSES

### 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 wood roof, floor and/or girder trusses and truss accessories.
- B. Related Sections include the following:
  - 1. Division 6 Section "Rough Carpentry" for roof sheathing and/or subflooring and dimension lumber for supplementary framing and permanent bracing.

#### 1.3 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. NELMA - Northeastern Lumber Manufacturers Association.
  - 2. NLGA - National Lumber Grades Authority.
  - 3. SPIB - Southern Pine Inspection Bureau.
  - 4. WCLIB - West Coast Lumber Inspection Bureau.
  - 5. WWPA - Western Wood Products Association.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated.
  - 1. Design Loads: As indicated.
  - 2. Maximum Deflection Under Design Loads:
    - a. Roof Trusses: Vertical deflection of 1/240 of span for Total Load, 1/360 of span for Live Load/Snow Load.
    - b. Roof Trusses: Horizontal deflection at reactions of 1-1/4 inches.
    - c. Floor Trusses: Vertical deflection of 1/360 of span.

## SECTION 06176 - METAL-PLATE-CONNECTED WOOD TRUSSES

### 1.5 SUBMITTALS

- A. Shop Drawings: Show location, pitch, span, camber, configuration, and spacing for each type of truss required; species, sizes, and stress grades of lumber; splice details; type, size, material, finish, design values, orientation, and location of metal connector plates; and bearing details.
  - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- B. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss fabricating firm.
- C. Qualification Data: For metal-plate manufacturer, professional engineer, fabricator and Installer.
- D. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.
- E. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
  - 1. Metal-plate connectors.
  - 2. Metal framing anchors.

### 1.6 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with TPI quality-control procedures for manufacture of connector plates published in TPI 1.
  - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
  - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that involves inspection by Timber Products Inspection, TPI, or other independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- C. Source Limitations for Connector Plates: Obtain metal connector plates through one source from a single manufacturer.
- D. Comply with applicable requirements and recommendations of the following publications:
  - 1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
  - 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."



## SECTION 06176 - METAL-PLATE-CONNECTED WOOD TRUSSES

3. TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."

E. Wood Structural Design Standard: Comply with applicable requirements in AFPA's "National Design Specifications for Wood Construction" and its "Supplement."

### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with TPI recommendations to avoid damage and lateral bending. Provide for air circulation around stacks and under coverings.

B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

### 1.8 COORDINATION

A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

#### 1. Metal Connector Plates:

- a. Alpine Engineered Products, Inc.
- b. CompuTrus, Inc.
- c. Eagle Metal Products.
- d. Jager Industries, Inc.
- e. Mitek Industries, Inc.
- f. Robbins Engineering, Inc.
- g. TEE-LOK Corporation.
- h. Truswal Systems Corporation.

#### 2. Metal Framing Anchors:

- a. Alpine Engineered Products, Inc.
- b. Cleveland Steel Specialty Co.
- c. Harlen Metal Products, Inc.
- d. KC Metals Products, Inc.

## SECTION 06176 - METAL-PLATE-CONNECTED WOOD TRUSSES

- e. Silver Metal Products, Inc.
- f. Simpson Strong-Tie Company, Inc.
- g. Southeastern Metals Manufacturing Co., Inc.
- h. United Steel Products Company, Inc.

### 2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. Provide dressed lumber, S4S, unless otherwise noted.
  - 3. Provide dry lumber with 15 percent maximum moisture content at time of dressing.
- B. Grade and Species: Provide dimension lumber of any species for truss chord and web members, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AFPA's "National Design Specifications for Wood Construction" and its "Supplement."

### 2.3 METAL CONNECTOR PLATES

- A. General: Fabricate connector plates to comply with TPI 1 from metal complying with requirements indicated below:
- B. Hot-Dip Galvanized Steel Sheet: ASTM A 653/A 653M, G60 coating designation; Grade 33, and not less than 0.0356 inch thick.

### 2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
  - 1. Where trusses are exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M).
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

## SECTION 06176 - METAL-PLATE-CONNECTED WOOD TRUSSES

- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

### 2.5 METAL FRAMING ANCHORS

- A. General: Provide framing anchors made from metal indicated, of structural capacity, type, and size indicated, and as follows:
  - 1. Research/Evaluation Reports: Provide products acceptable to authorities having jurisdiction and for which model code research/evaluation reports exist that show compliance of metal framing anchors, for application indicated, with building code in effect for Project.
  - 2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
- C. Truss Tie-Downs: Tie fasteners to truss and to face of top plate/plates.
- D. Floor Truss Hangers: U-shaped hangers to be fastened to supporting member.

### 2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, or approved equal with dry film containing a minimum of 94 percent zinc dust by weight.

### 2.7 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
  - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

## SECTION 06176 - METAL-PLATE-CONNECTED WOOD TRUSSES

- D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. Before installing, splice trusses delivered to Project site in more than one piece.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses as indicated, adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal framing anchors. Install fasteners through each fastener hole in metal framing anchor according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
  - 1. Anchor trusses to girder trusses as indicated.
- I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not cut or remove truss members.
- L. Replace wood trusses that are damaged or do not meet requirements.
  - 1. Do not alter trusses in field.

END OF SECTION 06176

## SECTION 07160 - BITUMINOUS DAMPPROOFING

### 1.1 GENERAL

- A. Submittals: Submit product data for each type of product specified, including data substantiating that materials comply with local regulations controlling use of volatile organic compounds (VOCs).

### 1.2 PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cold-Applied, Cut-Back Asphalt Dampproofing:
    - a. ChemRex, Inc.; Sonneborn Building Products Div.
    - b. Karnak Chemical Corporation.
    - c. Meadows: W.R. Meadows, Inc.
    - d. Or approved equal.
- B. Bituminous Dampproofing, General: Provide products recommended by manufacturer for designated application.
  - 1. Odor Elimination: Provide material warranted by manufacturer to be odor free after drying for 24 hours under normal conditions.
- C. Cold-Applied, Cut-Back Asphalt Dampproofing: Asphalt and solvent compound providing a firm, moisture-resistant, vapor-resistant, elastic coating.
  - 1. Trowel Grade: Asphalt roof cement complying with ASTM D 4586, Type I.
- D. Primer: Asphalt primer complying with ASTM D 41, for asphalt-based dampproofing.
- E. Glass Fabric: Woven glass fabric, treated with asphalt, complying with ASTM D 1668, Type I.

### 1.3 EXECUTION

- A. Preparation: Clean substrate and comply with recommendations of prime materials manufacturer.
  - 1. Fill voids, seal joints, and apply bond breakers as recommended by prime materials manufacturer.
  - 2. Install separate flashings and corner protection stripping as recommended by prime materials manufacturer.
  - 3. Prime substrate as recommended by prime materials manufacturer.
  - 4. Protection of Other Work: Prevent spillage and migration onto other surfaces of adjoining work.
- B. Application: Apply dampproofing where indicated on Drawings. Apply 2 coats as recommended by manufacturer.

## SECTION 07160 - BITUMINOUS DAMPPROOFING

1. Reinforcement: At changes in plane or as shown, install lapped course of glass fabric in first coat of dampproofing compound.
  2. Apply vertical dampproofing down walls from finished-grade line (below brick veneer) to top of footing, extend over top of footing, and down a minimum of 6 inches (150 mm) over outside face of footing. Extend 12 inches (300 mm) onto intersecting walls and footings, but do not extend onto surfaces exposed to view when the Project is completed.
- C. Cold-Applied, Cut-Back Asphalt Dampproofing: Apply on exterior surfaces only.
1. Trowel Grade: Apply at a minimum rate of 7 gal./100 sq. ft. (2.8 L/sq. m), to produce an average, dry-film thickness of 70 mils (1.8 mm) but not less than 30 mils (0.8 mm) at any point.
  2. Apply a second coat, as specified above, after allowing 24 hours for first coat to dry. Apply second coat at a rate of 0.8 to 1.25 gal./100 sq. ft. (0.3 to 0.5 L/sq. m). Double the thickness of second coat where first application has failed to produce a smooth, shiny, impervious coat.
- D. Protect exterior, below-grade dampproofing membrane from damage until backfill is completed. Remove over spray and spilled materials from surfaces not intended to receive dampproofing.
1. "APS Protection Course" or approved equal.

END OF SECTION 07160

## SECTION 07200 - WATER REPELLENTS (For Brick Veneer & Concrete Masonry Unit)

### 1.1 GENERAL

- A. Submit Product Data for each product specified.
- B. Warranty: 5-Year Manufacturer's Authorized Warranty. Test should be done before the application to determine the material needed to coat the surface.

### 1.2 PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
  - 1. BASF – Master Builders Solutions – MasterProtect H 177 for Brick
  - 2. MAB - Modac Products Company - Siloxane 40
  - 3. STO Concrete Restoration Division - STO Penetration Sealer CR650
  - 4. Chemprobe Technologies, Inc. - Chemprobe Prime-A-Pell H20 for Brick
- B. Siloxanes: Penetrating water repellent. Alkylalkoxysiloxanes that are oligomeric with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier.
  - 1. With more than 8.3-lb/gal. (400-g/L) VOCs.
- C. Silane/Siloxane Blends: Consisting of silanes and siloxanes blended to achieve a particular penetration and protection on a specific substrate.
  - 1. With more than 8.3-lb/gal. (400-g/L) VOCs.

### 2.1 EXECUTION

- A. **A preconstruction on site meeting is required** with the manufacturer's representative to verify the existing conditions, moisture test and sample area completed prior to the preconstruction meeting conform to the manufacturer's installation requirements and warranty.
- B. Preparation: Clean substrate and test for moisture content according to repellent manufacturer's written instructions.
  - 1. Concrete Masonry Unit: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of water repellents.
  - 2. Clay Brick Masonry: Clean clay brick masonry per ASTM D 5703.
- C. Test for pH level, according to water repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.
- D. Protect Adjoining Work: Cover nearby surfaces of aluminum and glass. Cover live plants and grass.
- E. Coordination with Sealants: Do not apply water repellent until sealants have been installed and cured.

SECTION 07200 - WATER REPELLENTS (For Brick Veneer & Concrete Masonry Unit)

- F. Application: Apply at the end of the project after the masonry has been completed for a minimum of six (6) months). If the Substantial Completion date is prior to this, the Contractor shall re-mobilize and complete this scope following the Substantial Completion date. Comply with manufacturer's written instructions. Apply a mist coat and a heavy-saturation coat using low-pressure spray equipment. Apply a second coat per manufacturer's written instructions.
- G. Remove protective coverings from adjacent surfaces and other protected areas.
- H. Clean adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses per manufacturer's written cleaning instructions. Repair damage caused by water-repellent application.

2.2 LOCATION

- A. The following areas are to be coated by this product.
  - 1. All new brick, CMU and Cast Stone veneer work (exposed to the exterior).
  - 2. All existing building areas as shown on the Contract Drawings.

END OF SECTION 07200



## SECTION 07210-BUILDING INSULATION

### 1.1 GENERAL

- A. Submittals: Product Data for each type of insulation product specified.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated as determined by testing identical products per NFPA 285, ASTM E 84, ASTM E 119, or ASTM E 136 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

### 1.2 PRODUCTS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
  - 1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thickness, widths and lengths.
- B. For below slab insulation: Extruded-Polystyrene Board Insulation: ASTM C 578 for type indicated below:
  - 1. Under Slab Type IV, 1.60-lb/cu. ft. (26-kg/cu. m) minimum density.
- C. For masonry cavity insulation: Board Insulation: Polyisocyanurate Foam – Board Insulation: ASTM C 1289, foil faced, Type I, Class 1 or 2. Do not tape the Board joints. Leave joints open for vapor permeability.
  - 1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- D. For all interior walls: Unfaced Mineral-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing) of type described below:
  - 1. Mineral-Fiber Type: Fibers manufactured from glass. (3 5/8" R=13, 6" R=19).
  - 2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.
- E. For all Exterior Stud Walls or Attic Spaces: Unfaced Mineral-Fiber Blanket Insulation: ASTM C 665, Type III, Class A.
  - 1. Mineral-Fiber Type: Fibers manufactured from glass. (6" R=19)
- F. For use as fire stop at openings between edge of slab and exterior wall panels: Provide a fire tested assembly where required. Slag-Wool-Fiber Board Safing Insulation: Semirigid boards designed and produced by combining slag-wool fibers with thermosetting resin binders to comply with ASTM C 612, Type IA and IB; nominal density of 4 lb/cu. ft. (64kg/cu. m); passing ASTM E 136 for combustion characteristics; thermal resistivity of 4 deg. F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).

## SECTION 07210-BUILDING INSULATION

1. Calking Compound: Material approved by manufacturer of safing insulation for sealing joint between foil backing of safing insulation and edge of concrete floor slab against penetration of smoke.
  2. Safing Clips: Galvanized steel safing clips approved by manufacturer of safing insulation for holding safing insulation in place.
- G. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of hooding insulation, of thickness indicated, securely in position indicated with self-locking washer in place; and complying with the following requirements:
1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
  2. Spindle: Copper-coated low carbon steel, fully annealed, 0.105 inches (2.67 mm) in diameter, length to suit depth of insulation indicated.

### 1.3 EXECUTION

- A. Installation, General: Comply with insulation manufacturer's written instructions applicable to products and application indicated.
1. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.
  2. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
  3. Apply single layer of insulation to produce thickness indicated.
  4. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.
  5. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant.
  6. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:
    - a. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
    - b. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  7. Install insulation in curtain-wall construction where indicated on Drawings according to curtain-wall manufacturer's written instructions.
  8. Retain insulation in place by metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated between insulation and glass.
  9. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.

## SECTION 07210-BUILDING INSULATION

10. Stuff glass-fiber, loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
  11. Attic insulation board should be a tight fit at the bottom of the rafters. Apply thermo-ply sheathing under insulation board to act as vapor barrier and insulation board support.
  12. In between bathroom walls and cavity walls where there is no gypsum wall board sheathing on the inside face, provide horizontal metal straps between studs at 48" on center to hold insulation in place.
- B. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to written instructions of insulation manufacturer.
- C. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors.
- D. Place loose-fill insulation into spaces and onto surfaces as shown, either by pouring or by machine blowing to comply with ASTM C 1015.
- E. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes.

### 1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 for surface-burning characteristics, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

END OF SECTION



## SECTION 07270 - FIRESTOPPING

### 1.1 GENERAL

- A. System Performance Requirements: Provide firestopping systems that are produced and installed to resist the spread of fire, according to the Room Finish Schedule Fire Rating indicated. The system shall resist the passage of smoke and other gases.
1. Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than the fire-resistance rating of the constructions penetrated.
  2. Provide through-penetration firestop systems with T ratings as well as F ratings, as determined per ASTM E 814.
  3. Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E 119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
  4. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
  5. For firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450, as determined per ASTM E 84.
  6. Provide penetration firestopping with mold and mildew resistance rating of one (1) or less as tested per ASTM G21
- B. Submittals: Provide a complete tested assembly of products with a specific tested assembly system. In addition, provide product data for each type of product in the assembly. Submit the following:
1. Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.
  2. Shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration firestop system, and each kind of construction condition penetrated and kind of penetrating item along with design designation of qualified testing and inspecting agency.
  3. Product certificates signed by manufacturers of firestopping products certifying compliance of their products with specified requirements.
  4. Product test reports from a qualified testing and inspecting agency evidencing compliance of firestopping with requirements based on comprehensive testing of current products. Test reports must indicate T and F ratings and all system performance requirements.
- C. Fire-Test-Response Characteristics: Provide firestopping that complies with the following requirements and those specified under the "System Performance Requirements" paragraph:
1. Firestopping tests are performed by a qualified testing and inspecting agency, including UL, Warnock Hersey, or an approved equal agency performing testing and follow-up inspection services, that is acceptable to authorities having jurisdiction.
  2. Through-penetration firestop systems are identical to those tested per ASTM E

## SECTION 07270 - FIRESTOPPING

814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly.

3. Fire-resistive joint sealant systems are identical to those tested for fire-response characteristics per ASTM E 119 under conditions where the positive furnace pressure differential is at least 0.01 inch of water, as measured 0.78 inch from the face exposed to furnace fire.
4. Ratings of Firestopping: As indicated by reference to designations of UL in their "Fire Resistance Directory" or by another qualified testing and inspecting agency.

### 1.2 PRODUCTS

A. Through-Penetration Firestop Systems: Comply with the following requirements in providing system components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating firestops under conditions of service and application, based on testing and field experience. Subject to compliance with requirements provide products manufactured by Hilti, 3M Fire Protection Products, STI – Specified Technologies, Inc., or approved equal.

1. Accessories: Provide the following components for each firestopping system as needed to install fill materials and to comply with "System Performance Requirements" paragraph:
  - a. Permanent forming/damming/backing materials including the following:
    - 1) Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
    - 2) Joint fillers for joint sealants.
  - b. Temporary forming materials.
  - c. Substrate primers.
  - d. Collars.
  - e. Steel sleeves.
2. Fill Materials: Provide through-penetration firestop systems composed of the fill materials indicated below:
  - a. Endothermic, Latex Compound Sealant: Single-component, endothermic, latex formulation.
  - b. Intumescent, Latex Sealant: Single-component, intumescent, latex formulation.
  - c. Intumescent Putty: Nonhardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.
  - d. Intumescent Wrap Strips: Single-component, elastomeric sheet with aluminum foil on one side.
  - e. Job-Mixed Vinyl Compound: Prepackaged vinyl-based powder product for mixing with water at Project site to produce a paintable compound, passing ASTM E 136, with flame-spread and smoke-developed ratings of zero per ASTM E 84.
  - f. Mortar: Prepackaged dry mix composed of a blend of inorganic binders,

## SECTION 07270 - FIRESTOPPING

- fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogenous mortar.
- g. Pillows/Bags: Re-usable, heat-expanding pillows/bags composed of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
  - h. Silicone Foam: Two-component, silicone-based liquid elastomer that, when mixed, expands and cures in place to produce a flexible, nonshrinking foam.
  - i. Silicone Sealant (ASTM E814 UL 14779) Standard Test Method for Fire Tests of Penetration Firestop Systems: Neutral-curing, single-component, silicone-based, intumescent, neutral-curing sealant.
  - j. Solvent-Release-Curing Intumescent Sealant: Solvent-release-curing, single-component, synthetic-polymer-based sealant.
  - k. Mineral Wool Insulation (ASTM C 518): 4 pcf actual density; .23 BTU in/hr SF 24°F; 4.3 R value; 0 Flame; 0 Smoke Developed.
  - l. Drop-In Firestop Devices: Factory-assembled devices for use with combustible or noncombustible penetrants in cored holes within concrete floors. Device shall consist of galvanized steel sleeve lined with an intumescent strip, an extended rectangular flange attached to one end of the sleeve for fastening to concrete floor, and neoprene gasket.
- B. Fire-Resistive Elastomeric Joint Sealants: Chemically curing, elastomeric sealants of base polymer indicated complying with ASTM C 920 requirements and requirements specified in this Section applicable to fire-resistive joint sealants.
- 1. Sealant Colors: Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.
  - 2. Single-Component, Neutral-Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, G, A, and (as applicable to joint substrates indicated) O.
    - a. Additional capability, when tested per ASTM C 719, to withstand the following percentage changes in joint width as measured at time of installation and still comply with other requirements of ASTM C 920:
      - 1) 100 percent movement in extension and 50 percent movement in compression for a total of 150 percent movement.
  - 3. Multicomponent, Nonsag, Urethane Sealant: Type M; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, A, and (as applicable to joint substrates indicated) O.
    - a. Additional capability, when tested per ASTM C 719, to withstand the following percentage changes in joint width as measured at time of installation and still comply with other requirements of ASTM C 920:
      - 1) 50 percent movement in both extension and compression for a total of 100 percent movement.

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4. Single-Component, Nonsag, Urethane Sealant: Type S; Grade NS; Class 25; and Uses NT, M, A, and (as applicable to joint substrates indicated) O.

1.3 EXECUTION

- A. Install through-penetration firestops to comply with the "System Performance Requirements" paragraph and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install fire-resistive joint sealant to comply with the "System Performance Requirements" paragraph, with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.

END OF SECTION 07270



## SECTION 07272 – FLUID-APPLIED MEMBRANE AIR BARRIERS

### PART 1 - GENERAL

#### 1.1 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 in its entirety 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 Subcontractor the extent of their Work.
- C. Throughout this Section there is basis of design products listed. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

#### 1.2 SUMMARY

- A. This Section includes requirements for supplying labor, materials, tools, and equipment to complete the Work as shown on the Drawings as specified herein including, but not limited to, the following:
  - 1. Adhesives/Primers
  - 2. Fluid Applied, Vapor Permeable Air & Water Barrier Membrane
  - 3. Transition Membranes
  - 4. Sealant
  - 5. Thru-wall flashing

#### 1.3 DEFINITIONS

- A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.
- D. Transition Membranes has the same meaning as Transition Strips.

#### 1.4 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
  - 1. AMMA 2400-02, Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction

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- B. American Society for Testing and Materials (ASTM):
1. ASTM D412, Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers - Tension
  2. ASTM D471, Standard Test Method for Rubber Property - Effect of Liquids
  3. ASTM D1970, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
  4. ASTM D2243, Standard Test Method for Freeze-Thaw Resistance of Water-Borne Coatings
  5. ASTM D5590, Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay
  6. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials
  7. ASTM E96, Standard Test Methods for Water Vapor Transmission of Materials
  8. ASTM E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
  9. ASTM E330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
  10. ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
  11. ASTM E1354, Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter
  12. ASTM E1677, Standard Specification for Air Barrier (AB) Material or System for Low- Rise Framed Building Walls
  13. ASTM E2112, Standard Practice for Installation of Exterior Windows, Doors and Skylights
  14. ASTM E2178, Standard Test Method for Air Permeance of Building Materials
  15. 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 Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components
- D. US Green Building Council (USGBC), Leadership in Energy and Environmental Design (LEED):
1. LEED Reference Guide, Version 4.0, and USGBC Project Calculation Spreadsheet. Web Site <http://www.usgbc.org>.

## SECTION 07272 – FLUID-APPLIED MEMBRANE AIR BARRIERS

### 1.5 ADMINISTRATIVE REQUIREMENTS

#### A. Coordination:

1. Coordinate the Work of this Section with the installation of exterior substrate. Sequence Work so that installation of fluid-applied air barrier coincides with installation of substrate preparation without causing delay to the Work.

#### B. Pre-installation meetings:

1. Pre-installation Conference: Conduct conference at Project site.
2. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.
3. Air 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.

### 1.6 SUBMITTALS

#### A. ACTION SUBMITTALS:

1. Product Data: For each type of product.
  - a. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.
  - b. Air Barrier Manufacturer's guide specification.
  - c. Air Barrier Manufacturer's complete set of technical data sheets for assembly.
  - d. Air Barrier Manufacturer's complete set of standard detail drawings.
2. Shop Drawings: For air-barrier assemblies.
  - a. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
  - b. Include details of interfaces with other materials that form part of air barrier.

#### B. INFORMATIONAL SUBMITTALS

1. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by the Installer, who work on Project.
2. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.
3. Product Test Reports: For each product, for tests performed by a qualified testing agency.

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- a. NFPA 285 wall assembly compliance: Air Barrier Manufacturer statement that anticipated wall assembly passes NFPA 285.
4. Evaluation Reports: from ICC-ES
5. Product certification that the assembly components are supplied and warranted by single source Air Barrier Manufacturer.
6. Statement that installing contractor is authorized by Air Barrier Manufacturer to complete Work as specified.
7. Statement that materials are adhesively and chemical compatible with adjacent materials proposed for use.
8. Reports indicating that field peel-adhesion test on all materials to which sealants are adhered have been performed and the changes made, if required, to other approved materials, in order to achieve successful adhesion.
9. Letter from primary materials manufacturer indicating compatibility of products not manufactured by primary manufacturer.
10. Submit Eco-Efficiency Analysis of each material.
11. Submit recommended values for field adhesion test on each substrate.
12. Submit accreditation number of manufacturer and certification number of installers.
13. Warranty: Sample warranty as specified.

### 1.7 QUALITY ASSURANCE

#### A. Single Source Responsibility:

1. Obtain fluid-applied membrane air barrier, transition membranes, air barrier sealants, primers, mastics, and adhesives from a single Air 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 Barrier Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:
  - a. Air 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 Air Barrier Manufacturer published literature and as specified in this section.
  - a. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

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2. Maintain one (1) copy of Air Barrier Manufacturer's instructions on site.
  3. At all times during the execution of the Work allow access to site by the Air Barrier Manufacturer representative.
  4. If meeting with Air Barrier Manufacturer during project construction, contact Air Barrier Manufacturer a minimum of two weeks prior to schedule meeting.
- D. VOC Regulations: Provide products which comply with applicable regulations controlling the use of volatile organic compounds.
- E. Preconstruction Meeting: Organize and convene a minimum of two weeks prior to commencing Work of this Section. Agenda shall include, at a minimum, construction and testing of mock-up, sequence of construction, coordination with substrate preparation, materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction. General Contractor is responsible for all site safety requirements. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.

### 1.8 MOCK-UPS

- A. Construct mock-ups to verify selections made under submittals and to set quality standards for materials and execution in accordance with requirements.
- B. Mock-Ups: General Contractor is responsible for coordinating the construction of the mock-up. Mock-up shall be representative of primary exterior wall assemblies and glazing assemblies including backup wall, air-barrier assemblies and typical penetrations. Mock-up shall be approximately 8 feet long by 8 feet high and include all components in the exterior wall assembly and as indicated.
- C. Mock-Up Tests for Adhesion: Test mock-up of materials for adhesion in accordance with manufacturer's recommendations. Perform test after curing period recommended by the manufacturer. Record mode of failure and the area(s) which failed the project requirements. When the air barrier material manufacturer has established a minimum adhesion level for the product on the particular substrate, the inspection report shall indicate whether this requirement has been met.

### 1.9 MANUFACTURERS QUALIFICATIONS / ALTERNATE MANUFACTURERS:

- A. The materials outlined are the type of materials to be used on this project. Please refer to Specification Section 01300, "Submittals." "Or Equal" substitutions are permitted so long as they are equal to or superior to the basis of design and the Contractor takes full responsibility for all coordination and costs associated with collateral issues related to the substitution. No Substitutions will be reviewed during the bidding process. The Contractor takes full responsibility for all substitutions. Substitution submittals shall be made no later than 30 days after Notice to Proceed in order to provide time for comparison review. All submittals after 30 days shall be in strict accordance with the basis of design / specified products. No Substitutions will be considered after 30 days. The following manufacturer criteria must be submitted with the substitution request.

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### 1.10 PERIODIC INSPECTION BY MANUFACTURER’S REPRESENTATIVE

- A. When the project is in progress, the Air Barrier manufacturer shall inspect the work not less than 2 days per week. In addition, the manufacturer shall:
  - 1. Keep the architect and Owner's on site representative informed as to the progress and quality of the work as observed.
  - 2. Report to architect and Owner’s on-site representative in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor’s attention.
  - 3. Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

### 1.11 DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials:
  - 1. Materials shall be delivered to the jobsite in undamaged and clearly marked containers indicating the name of the Air Barrier Manufacturer and product.
- B. Storage of Materials:
  - 1. Store materials as recommended by Air Barrier Manufacturer and conforming to applicable safety regulatory agencies. Refer to all applicable data including but not limited to MSDS sheets, Product Data sheets, product labels, and specific instructions for personal protection.
  - 2. Keep solvents away from open flame or excessive heat.
  - 3. Products should be stored in closed containers.
  - 4. Store rolled materials on end in original packaging.
  - 5. Protect rolls from direct sunlight until ready for use.
  - 6. Refer to Air Barrier Manufacturer published literature.
- C. Handling:
  - 1. Refer to Air Barrier Manufacturer published literature.

### 1.12 SITE CONDITIONS

- A. Environmental Requirements:
  - 1. No Work shall be performed during rain or inclement weather.
  - 2. No Work shall be performed on frost or wet covered surfaces.
- B. Protection:
  - 1. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane.

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- C. Ensure all preparation Work is completed prior to installing fluid-applied membrane air barrier.

1.13 WARRANTY

- A. Provide manufacturer's exposure warranty that offers twelve (12) months of coverage against in-place exposure damage (delamination, deterioration) beginning with the date of installation of the product.
- B. Provide manufacturer's standard warranty for sheathing to be free of manufacturing defects that make it unsuitable for its intended use. Warranty period shall be Ten (10) years from the date of Purchase.
- C. Installer's Warranty: Provide an Installer's Warranty for two (2) years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS MANUFACTURER

- D. Components and auxiliary materials must be obtained as a single-source from the assembly Air Barrier Manufacturer to ensure total system compatibility and integrity.
- E. Basis of Design (Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.)
  - 1. Henry Company  
Or Approved Equal

2.2 MATERIALS

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.
- B. Primary Fluid-Applied Membrane Air Barrier (Basis of Design):
  - 1. One-component, water-based, elastomeric emulsion membrane, designed to provide a vapor permeable air and water barrier when applied above-grade wall assemblies, having the following properties:
    - a. Basis of Design Product: Air-Bloc 17MR
    - b. Color: Graphite
    - c. Solids Content:
      - 1) By Weight: 63%
      - 2) By Volume: 53%
    - d. Service Temperature:

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- 1) Low Temperature: -40 degrees F (-40 degrees C)
  - 2) High Temperature: +180 degrees F (+80 degrees C)
- e. Application Temperature:
- 1) Low Temperature: +20 degrees F (-6 degrees C)
  - 2) High Temperature: +122 degrees F (+50 degrees C)
- f. Tensile Strength (ASTM D412): 104 psi (717 kPa)
- g. Elongation (ASTM D412): 420%
- h. Low Temperature Flexibility @ -22 degrees F (-30 degrees C) (ASTM D1970): Pass
- i. Freeze-Thaw Resistance (ASTM D2243): Pass; 10 cycles
- j. Nail Sealability (ASTM D1970): Pass
- k. VOC Content: 100 grams/liter max.
- l. Water Absorption (ASTM D471, modified): 5.6%
- m. Water Vapor Permeance (ASTM E96 B) @ 40 mils nominal dry film: 14 perms
- n. Air Permeability:
- 1) Assembly Air Leakage (ASTM E2357): Pass
  - 2) Building Material (ASTM E2178): 0.0001 cfm/ft<sup>2</sup> (0.0005 L/s.m<sup>2</sup>)
- o. Chemical Resistance: Resists salt solutions, mild acids and alkalis. Non-resistant to oils, grease or solvents
- p. Fire Testing (NFPA 285): Complies in various assemblies
- q. Flame Spread/Smoke Development (ASTM E84): 10/15
- r. Resistance to Mold, Mildew, and Fungal Growth (ASTM D5590): No growth
- C. Auxiliary Materials

1. Transition Membranes:

a. Liquid applied flashings:

- 1) Moisture-curing one component elastomeric liquid applied flashing membrane using a highly advanced STPe (Silyl-Terminated Polyether) polymer, having the following properties:
  - a) Basis of Design Product: Air-Bloc LF
  - b) Color: Blue
  - c) Air Leakage (ASTM E2178): <0.004 L/s/m<sup>2</sup> @ 75Pa
  - d) Water Vapor Permeance (ASTM E96, Method B): 21.8 perms @25 mils
  - e) Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
  - f) Water Resistance (AC212/ASTM D2247): Pass



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- g) Nail Sealability (AMMA 711): Pass
      - h) Surface Burning Characteristics (ASTM E84):
    - 2) Class A
    - 3) Flame Spread/Smoke Development (ASTM E84): 20/5
  - a) Tensile Strength (ASTM D412): 132 psi
    - b) Elongation (ASTM D412): 264%
  - b. Self-Adhering flashings:
    - 1) Non-vapor permeable, self-adhered water resistive air and vapor barrier membrane consisting of an SBS rubberized asphalt compound, which is integrally laminated to a blue engineered thermoplastic film, having the following properties:
      - a) Basis of Design Product: Blueskin SA
      - b) Color: Blue
      - c) Water Vapor Permeance (ASTM E96, Method A): .86 perms
      - d) Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
      - e) Air Leakage (ASTM E2178): <0.0005 L/s/m<sup>2</sup> @ 75Pa
      - f) Water Tightness (CAN/CGSB-37.58-M86): Pass.
      - g) Nail Sealability (ASTM D1970): Pass.
      - h) Tensile Strength:
    - 2) Membrane (ASTM D412-modified): 500 psi minimum
    - 3) Film (ASTM D828): 5000 psi minimum
      - a) Elongation (ASTM D412-modified): 200% minimum
2. Sheathing Joint Membranes:
  - a. Vapor permeable, self-adhered water resistive air barrier membrane consisting of an engineered film and patented, permeable adhesive technology with split-back poly-release film, having the following properties:
    - 1) Basis of Design Product: Blueskin VP160
    - 2) Color: Blue
    - 3) Air Leakage (ASTM E2178): <0.02 L/s/m<sup>2</sup> @ 75Pa
    - 4) Water Vapor Permeance (ASTM E96, Method A): 29 perms
    - 5) Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
    - 6) Resistance to Water Penetration (ICC-ES AC 38): Pass.
    - 7) Nail Sealability (ASTM D1970): Pass
    - 8) Surface Burning Characteristics (ASTM E84):
      - a) Class A
      - b) Flame Spread/Smoke Development (ASTM E84): 0/105

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- 9) Tensile Strength (ASTM D828): 182N MD/129N CD
    - 10) Cycling and Elongation (ICC-ES AC48): Pass
  - b. Contact Air Barrier Manufacturer for a complete list of authorized transition membranes.
3. Adhesives and Primers:
  - a. Spray adhesive, and having the following properties:
    - 1) Basis of Design Product: Blueskin Spray Prep
    - 2) Color: Clear amber
    - 3) Solids Content (By Weight): 35%
    - 4) Aerosol
  - b. Polymer emulsion based adhesive type, quick setting, low VOC content, having the following properties:
    - 1) Basis of Design Product: Blueskin LVC Adhesive
    - 2) Color: Blue.
    - 3) Solids Content (By Weight): 40%.
    - 4) Solvent based: 240 g/L.
  - c. Polymer emulsion based primer for self-adhered membranes, and having the following properties:
    - 1) Basis of Design Product: Aquatac Primer
    - 2) Color: Aqua.
    - 3) Solids Content (By Weight): 58%.
    - 4) Water based: Maximum VOC: 50 g/l
4. Sealants:
  - a. Building Envelope Sealant:
    - 1) Moisture cure, medium modulus polymer modified sealing compound, having the following properties:
      - a) Basis of Design Product: HE925 BES Sealant
      - b) Complies with Fed. Spec. TT-S-00230C, Type II, Class A.
      - c) Complies with ASTM C920, Type S, Grade NS, Class 35.
      - d) Elongation: 450 – 550%.
      - e) Remains flexible with aging.
  - b. Sheathing Joint Sealants:
    - 1) As recommended by Air Barrier Manufacturer

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- c. Contact Air Barrier Manufacturer for a complete list of authorized sealants.
- 5. Self-Adhesive Thru-Wall Flashing Membrane:
  - a. Non-vapor permeable, self-adhered water resistive air and vapor barrier membrane consisting of an SBS rubberized asphalt compound, which is integrally laminated to a blue engineered thermoplastic film, having the following properties:
    - 1) Basis of Design Product: Blueskin TWF
    - 2) Color: Yellow
    - 3) High Temperature Stability - Flow Resistance (ASTM D5147): Pass
    - 4) Air leakage (ASTM E283): 0.005 L/s.m<sup>2</sup> @ 75 Pa
    - 5) Water vapor permeance (ASTM E96, Method B): 0.03 perms
    - 6) Low temperature flexibility (CGSB 37-GP-56M): Pass
- 6. Termination bar: stainless steel with sealant receiver.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Substrate Conditions:
  - 1. Verify substrates to receive work and surrounding adjacent surfaces are in accordance with Air Barrier Manufacturer published literature prior to installation of fluid applied membrane air barrier assembly.
  - 2. Sheathing panels must be securely fastened and installed flush to ensure a continuous substrate in accordance with Air Barrier Manufacturer published literature.
  - 3. Fastener penetrations must be set flush with sheathing and fastened into solid backing.
  - 4. Mortar joints in concrete block and form tie holes/voids in poured concrete shall be filled, flush, smooth, and allowed to be cured for a minimum of twenty-four (24) hours.
  - 5. New concrete should be cured for a minimum of sixteen (16) hours after forms are removed.
  - 6. Cap and protect exposed back-up walls against wet weather conditions prior to application of fluid applied membrane air barrier assembly.
  - 7. Exterior surfaces of existing CMU walls are parged with  $\pm \frac{1}{2}$  inch of portland cement mortar with a high variability of surface irregularity.
    - a. CMU and Parging Repair is described in the Drawings
- B. Notify contractor in writing of any conditions that are not acceptable.

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- 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 acceptance of the substrate.

### 3.2 PREPARATION

- A. All surfaces must be sound, dry to touch, 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. 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 fluid applied membrane air barrier to substrate.
    - b. Allow fluid applied membrane air barrier to fully cure prior to subsequent application.
    - c. Install primary fluid applied membrane air barrier to Air Barrier Manufacturer minimum recommended mil thickness.
  - 2. Two coat:
    - a. Apply fluid applied membrane air barrier to achieve one-half (1/2) of Air Barrier Manufacturer minimum recommended mil thickness.
    - b. Allow fluid applied membrane air barrier to fully cure prior to subsequent application.
    - c. Apply fluid applied membrane air barrier to achieve one-half (1/2) of Air Barrier Manufacturer minimum recommended mil thickness.
    - d. Overall dry mil thickness shall be in accordance with Air Barrier Air Barrier Manufacturer published literature.

### 3.3 INSTALLATION

- A. Ensure substrate is ready to receive fluid applied membrane air barrier in accordance with published literature.
- B. If fluid applied membrane air barrier should freeze while in storage, move containers to a controlled environment above 32 degrees F (0 degrees C) until thawed and re-mix using a hand operated power mixer prior to use.
- C. Fluid applied membrane air barrier shall not be applied when ambient (air) and substrate temperatures are below 20 degrees F (-6 degrees C).

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- D. Do not proceed with application of air barrier membrane when rain is expected within 16 hours.
- E. Apply sealant at sharp corners, changes in substrate plane, penetrations, and edges to form a smooth transition from one plane to another.
- F. Non-Moving Substrate Joint and Crack Treatment:
  - 1. Gaps equal to or less than 3/8 inch (10 mm) wide:
    - a. Sheathing Joint Sealant:
      - 1) Apply sealant at rate recommended by Air Barrier Manufacturer.
      - 2) Spread sealant at joint extending a minimum one (1) inch beyond gap to ensure a continuous air and watertight assembly.
    - 2. Gaps equal to or less than 1/2 inch (12 mm) wide:
      - a. Building Envelope Sealant:
        - 1) Apply sealant at rate recommended by Air Barrier Manufacturer.
        - 2) Spread sealant at joint extending a minimum one (1) inch on each side of substrate gap.
      - b. Liquid applied flashings:
        - 1) Apply liquid applied flashing at rate recommended by Air Barrier Manufacturer.
        - 2) Apply liquid applied flashing in accordance with Air Barrier Manufacturer published literature extending a minimum of two (2) inches on each side of substrate gap.
      - c. Self-adhering flashings:
        - 1) Apply primer to substrate and allow curing in accordance with published literature prior to installation of self-adhered flashing.
        - 2) Apply self-adhering flashing in accordance with Air Barrier Manufacturer published literature extending a minimum of three (3) inches on each side of substrate gap.
        - 3) Roll membrane with countertop roller to eliminate air pockets between self-adhered flashing and substrate ensuring full adhesion of membrane onto substrate.
        - 4) Seal exposed leading edges of self-adhered membrane with sealant.
    - 3. Gaps greater than 1/2 inch wide:
      - a. Contact Air Barrier Manufacturer.

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- G. Refer to Drawings and Air Barrier Manufacturer requirements for installation procedures including, but not limited to, the following:
1. General:
    - a. Coordinate all requirements and notify the architect and the Owner's on site representative of conflicting direction noted. Do not proceed with the Work until the conflict is resolved and written notice is given on how to proceed.
  2. Inside corners
  3. Outside corners
  4. Crack treatment
  5. Penetrations
  6. Rough openings
  7. Control joints
  8. Expansion joints
  9. Changes in substrate
- H. Contact Air Barrier Manufacturer to coordinate transition of fluid applied membrane 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
  4. Foundation and walls, including penetrations, ties and anchors.
  5. Walls, windows, curtain walls, storefronts, louvers or doors.
  6. Dissimilar wall assemblies and fixed openings within those assemblies.
  7. Wall and roof connections.
  8. Floors over unconditioned space.
  9. Walls, floor and roof across construction, control and expansion joints.
  10. Utility, pipe and duct penetrations.
  11. Seismic and expansion and control joints.
  12. Leakage pathways in the building envelope.
- I. Thru-Wall Flashing:
1. Coordinate with Section 04200 Unit Masonry
  2. Provide drip plate as indicated.
- J. Primary Liquid Air Barrier Membrane
1. Install fluid applied membrane air barrier in accordance with Air Barrier Manufacturer published literature to ensure an air and watertight fluid applied membrane air barrier assembly.
  2. Fluid applied membrane air barrier assembly must be installed in a monolithic application without sags, runs or voids, and transitioning with auxiliary components to create a uniform drainage plane and air barrier.

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3. Install fluid applied membrane air barrier and transition membranes so that subsequent membrane installation laps one (1) inch (2.5 cm) onto existing membrane ensuring an air and watertight fluid applied membrane air barrier assembly.
4. Fluid applied membrane air barrier total dry thickness shall be in accordance with Air Barrier Manufacturer published literature. Refer to Air Barrier Manufacturer Technical Data Sheet.

### 3.4 FIELD QUALITY CONTROL

#### A. Final Observation and Verification:

1. Final inspection of fluid applied membrane air barrier assembly shall be carried out by the Owner's representative, the contractor, and Air Barrier Manufacturer representative.
2. Contact Air Barrier Manufacturer for warranty issuance requirements.

#### B. Fluid applied membrane air barrier assembly is not designed for permanent UV exposure. Refer to Air Barrier Manufacturer published literature for product limitations.

### 3.5 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





## SECTION 07410 - PREFORMED METAL ROOFING

### PART 1 - GENERAL

#### 1.1 DESCRIPTION:

- A. Work described in this section includes preformed metal roofing system complete with clips, perimeter and penetration flashing, closures, gutters and downspouts.
- B. This roof system is to be installed over plywood decking with self adhered underlayment.
- C. Snow retention system installed to metal roof panels with non-penetrating clamps.

#### 1.2 RELATED SECTIONS.

- A. Drawings and general provisions of the Contract, including General Supplementary Conditions and Specification Sections apply to this section.

#### 1.3 SUBMITTALS:

- A. Shop drawings: Show roofing system with flashings and accessories in plan and elevation; sections and details. Include metal thickness and finishes, panel lengths, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations; existing beam locations, purlin and girt locations, thermal expansion provisions and special supports. Indicate relationships with adjacent and interfacing work. Shop drawings must be completed by the metal panel manufacturer's engineering department. Any and/or all changes recommended by the successful bidder must be approved by the manufacturer in writing prior to submittal.
- B. Product Data: Include manufacturer's detailed material and system description, sealant and closure installation instructions, engineering performance data and finish specifications.
- C. Design test reports:
  - 1. Indicate fastener types and spacings; and provide fastener pullout values.
  - 2. Submit copy of manufacturer's minimum design load calculations according to ASCE-7-16.
  - 3. Submit copy of certification from manufacturer stating that specified system has been tested in accordance with ASTM-1592 requirements by an independent Engineering Firm. All test results must be submitted including Air (ASTM E 283 & E 1680) and Water (ASTM E 331 & E 1646) Infiltration Tests. These test results must meet or exceed those listed in Section 1.8 (Design and Performance Criteria) and be stamped by an independent Engineering Firm.

#### 1.4 INSTALLER QUALIFICATIONS:

- A. Engage an experienced metal roofing contractor (erector) to install standing seam system who has a minimum of three (3) years experience specializing in the installation of structural standing seam metal roof systems.
- B. Contractor must be certified by manufacturer specified as supplier of structural standing seam system and obtain written certification from manufacturer that installer is approved

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- for installation of specified system. If requested, contractor must supply owner with a copy of this certification.
- C. Successful contractor is required to maintain a full-time supervisor/foreman who is on the job-site at all times during installation of new roof system. Foreman must have a minimum of five (5) years experience with the installation of system similar to that specified.
  - D. Successful contractor must obtain all components of roof system from a single manufacturer including any roll good materials if required. Any secondary products that are required which cannot be supplied by the specified manufacturer must be recommended, approved and warranted in writing by primary manufacturer prior to bidding.
  - E. If required, fabricator/installer shall submit work experience and evidence of adequate financial responsibility. The owners representative reserves the right to inspect fabrication facilities in determining qualifications.

### 1.5 MANUFACTURERS QUALIFICATIONS / ALTERNATE MANUFACTURERS:

- A. The materials outlined in the Material and Method Specifications are the type of materials that should be used on this project. Bidder will not be allowed to supply panels formed at the job-site on portable rollformers that vary whatsoever from the factory equipment; metal panels must be pre-manufactured and engineered for this project. Bidder will not be allowed to change materials after the bid opening date.
  - 1. Submit certified test reports from a testing laboratory that bear the stamp of a registered P.E. to show compliance with specified performance criteria. Test reports must meet the specified negative uplift pressures as listed per this specification for the gauge, panel width and clip spacing specified as confirmed by manufacturers ASTM-E 1592 test results.
  - 2. Tests shall have been made for identical systems within the ranges of specified performance criteria.
  - 3. Empirical calculations for roof performance shall only be acceptable for positive loads.
  - 4. Indicate fastener types and spacings and provide fastener pullout values.
  - 5. Submit copy of UL 90 classification in accordance with UL 580 test procedure.
  - 6. Submit copy of certification from manufacturer stating that specified system has been tested in accordance with ASTM-1592 requirements by an independent Engineering Firm. All test results must be submitted including Air (ASTM E 283 & E1680) and Water (ASTM E 331 & E 1646) Infiltration Tests and meet or exceed those listed in Section 1.8 (Design and Performance Criteria)
  - 7. A list of a minimum of five (5) jobs where the proposed alternate material was used under similar conditions. The reference list shall include date of project, size of project, address and contact telephone number.
  - 8. A written statement from the manufacturer stating that they will provide the building owner with a daily site inspection for a minimum of two (2) hours by an experienced, full time employee of the company.
  - 9. A written statement from a corporate officer of the manufacturing company stating that he or she has reviewed the specifications and confirms that the proposed system meets or exceeds all performance requirements listed as well as meets the panel size, gauge, weight, clip design, sealant design, uplift pressures and height of the vertical seam.

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10. A copy of manufacturer's warranty covering both material and labor for all roofing included in the contract including metal roofing, metal edge, metal wall panels, soffit, trim, etc. The warranty must include the entire roof system from edge to edge inclusive.
11. Provide an audited financial statement demonstrating a current ratio of 5:1 or better.
12. Supplier of metal panel must be the actual manufacturer. Private label will not be accepted.

B. The following samples must be submitted by alternate manufacturers:

1. Submit sample of panel section, at least 6" x 6" showing seam profile and also a sample of color selected.
2. Submit sample of panel clip.
3. Submit sample of purlin (Z) and/or bearing plate if required.
4. Submit sample of base sheet, roll goods and/or mastics if required.
5. 30 year NDL warranty covering labor & material

### 1.6 DELIVERY, STORAGE, AND HANDLING:

A. Manufacturer's responsibility:

1. Protect components during fabrication and packing from mechanical abuse, stains, discoloration, and corrosion.
2. Provide protective interleaving between contact areas of exposed surfaces to prevent abrasion during shipment, storage, and handling.

B. Installer's responsibility:

1. Store materials off ground providing for drainage; under cover providing for air circulation; and protected from wind movement, foreign material contamination, mechanical damage, cement, lime or other corrosive substances.
2. Handle materials to prevent damage to surfaces, edges and ends of roofing sheets and sheet metal items. Damaged material shall be rejected and removed from the site.
3. Protect panels from wind-related damages.
4. Inspect materials upon delivery. Reject and remove physically damaged or marred material from project site.

### 1.7 JOB CONDITIONS:

A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for preformed metal roofing system.

B. Protection:

1. Provide protection or avoid traffic on completed roof surfaces.
2. Do not overload roof with stored materials.
3. Support no roof-mounted equipment directly on roofing system.

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- C. Ascertain that work of other trades which penetrates the roof or is to be made watertight by the roof is in place and approved prior to installation of roofing.
  - 1. Coordinate with masonry contractor to ensure that through-wall flashing is set at proper height to allow for minimum required flashing heights above finished roof system.

### 1.8 QUALITY CRITERIA:

#### A. Applicable standards:

- 1. American Iron and Steel Institute (AISI):  
1986 Specification for the Design of Cold-Formed Steel Structural Members.
- 2. American Society for Testing and Materials (ASTM):
  - A36-12 Standard Specification for Carbon Structural Steel
  - A123-13 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - A500-13 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
  - A653-13 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - B209-96 Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - D1056-91 Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
  - D3575-84 Test Methods for Flexible Cellular Materials made from Olefin Polymers.
  - E283-93 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
  - E1680-95 Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
  - E1592-95 Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
  - E331-86 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
  - E1646-95 Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
- 3. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):  
1993 Architectural Sheet Metal Manual, 5th edition.
- 4. Underwriters' Laboratories (UL):
  - Standard UL - 580 Tests for Wind-Uplift Resistance of Roof Assemblies.
  - Standard UL - 263 Tests for Fire Resistance
  - Standard UL - 790 Class A Fire Rating.

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- B. Applicable erection tolerances: Maximum variation from true planes or lines: 1/4" in 20'-0"; 3/8" in 40'-0" or more.
- C. Site Formed Panels: Panels in excess of shippable length shall be formed on-site. Site formed panels shall meet each of the following requirements:
  - 1. Panels shall be formed on heavy duty factory type roll formers. Roll formers shall gradually form the panel profile utilizing no fewer than twelve (12) forming stations to improve quality and minimize oil canning.
  - 2. All tooling shall be polished and tempered to a minimum hardness of Rockwell C - 52. Tooling shall be maintained clean and in good working condition. Tooling repairs or modifications made by means of welding, sawing, grinding, or the like are unacceptable, as they may contribute to poor quality, aesthetics, and performance of the end product.
  - 3. Panels shall be of identical profile and characteristics as factory formed panels and specimens used as the basis of performance tests.
  - 4. Sealant shall be factory applied in a separate factory formed snap on cap. Site/field applied seam sealant is unacceptable. Seam caps may be shipped in forty-five (45) feet or less length and lap spliced over full length panels in accordance with manufacturer's system details.
  - 5. Site roll forming equipment shall be operated by a trained full time experienced technician. The installer must provide additional personnel to handle raw materials and finished product as necessary.

### 1.9 DESIGN AND PERFORMANCE CRITERIA:

- A. Thermal Movement:
  - 1. Completed metal roofing and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.
  - 2. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.
  - 3. Location of metal roofing rigid connector shall be at roof ridge unless otherwise approved and designed per job conditions by specified manufacturer.
- B. Uniform wind load capacity:
  - 1. Installed roof system shall withstand positive and negative design wind loading pressures complying with:
    - a. Design Code: ASCE 7-16
    - b. Importance Factor: III
    - c. Exposure Category: C
    - d. Wind Speed of 125 mph
    - e. Clip Pry Coefficient: 1.65

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- f. Ultimate pullout 626 lbs. per screw
- g. Design Roof Height: 15 ft
- h. Panel Safety Factor: 1.67
- i. Extreme thermal range 200°F
- j. Minimum building width; 90'
- k. Roof Pitch: 3.5:12

Roof Location	Negative Pressures	Clip Spacings
Roof Panel - Zone 1 (mid-roof)	32.0	5'0"
Eaves - Zone 2e	40.7	4'7"
Ridge - Zone 2r	51.1	3'8"
Corners - Zone 3	40.7	4'7"
Zones 2 & 3 required width	4'8"	

- 2. Capacity for structural standing seam roof panels shall be determined using pleated airbag method in accordance with ASTM E 1592, testing of sheet metal roof panels as follows:
  - a. Roof test specimens shall be either full length or representative of the main body of the roof, free from edge restraint or perimeter attachments, continuous over one or more supports, and containing at least five panel modules for standing seam roof.
  - b. No attachments shall be permitted at sides or end perimeter other than those that occur uniformly throughout roof. Side and end seals shall be flexible and in no way restrain crosswise distortion of panels.
  - c. Panels and accessories shall be production materials of same type and thickness proposed for use on project.
- 3. Installed roof system shall carry positive uniform design loads with a maximum system deflection of L/180 as measured at the rib (web) of the panel.

C. ASTM E283: Static pressure air infiltration:

Pressure	Leakage Rate Structural Standing Seam	Leakage Rate Tower Dome Panels
1.57 PSF	0.0007 cfm/sq.ft.	0.180 cfm/sq.ft.
6.24 PSF	0.0002 cfm/sq.ft.	0.400 cfm/sq.ft.
20.0 PSF	0.0036 cfm/sq.ft.	0.600 cfm/sq.ft.

D. ASTM 1680: Standard Test Method For Rate Of Air Leakage Through Metal Roof Panel Systems (Structural Standing Seam panels only):

Pressure	Area Leakage Rate	Seam Leakage rate
1.57 PSF	0.0012 cfm/sq.ft.	0.0016 cfm./ l.f.
6.24 PSF	0.0000 cfm/sq.ft.	0.0001 cfm./ l.f.
20.0 PSF	0.0011 cfm/sq.ft.	0.0015 cfm./ l.f.

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- E. ASTM E331: Static pressure water infiltration (Structural Standing Seam and Tower Dome architectural panels):

Pressure	Result
5 Gal/Hr Per S.F. and Static Pressure Of 20.0 Psf for 15 minutes	No Leakage

- F. ASTM 1646: Standard Test Method for Water Penetrations of Exterior Metal Roof Panels by Uniform Static Air Pressure Difference (Structural Standing Seam panels only):

Pressure	Result
5 Gal/Hr Per S.F. and Static Pressure Of 20.0 Psf for 15 minutes	No Leakage

- G. Water penetration (dynamic pressure): No water penetration, other than condensation, when exposed to dynamic rain and 70 mph wind velocities for not less than five minutes duration, when tested in accord with principles of AAMA 501.1 (Structural Standing Seam panels only).

- H. Capacities for gauge, span or loading other than those tested may be determined by interpolation of test results within the range of test data. Extrapolation for conditions outside test range are not acceptable.

- I. Snow Load:

1. Ground Snow Load 20 psf
2. Balanced Uniform Roof Snow Load 22 psf
3. Maximum Unbalanced Surcharge Load 12.5 psf
4. Unbalanced Width 6.9 feet
5. Drift From Higher Roof? No
6. Total Average Snow Load 25.8 psf
7. Roof Pitch 3.5 /12
8. Panel Width 16 in
9. Panel Type R-Mer Span
10. Panel Material 24 ga Steel
11. Snow Guard Type S-5! Color Gard
12. Horizontal Run to Ridge 23 ft
13. Terrain Factor Fully
14. Thermal Factor 1.2
15. Safety Factor 2
16. Equivalent Uniform Design Snow load 25.8 psf vertical
17. Sliding Force 7.2 psf along slope
18. Tributary Vector Force 230 lbs per panel
19. Amount of Snow Guards 1 row(s)\*
20. Fixed Panel Connections: 1/8" SS Rivets Per Seam 2 (Use two rivets **OR** one 1/4" bolt.)

1.10 WARRANTIES:

- A. Owner shall receive warranty from manufacturer of roof panels covering all of the following criteria.

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1. Manufacturer's 30 year NDL watertight warranty including structural standing seam roof.
2. 20 year coverage on finish including checking, crazing, peeling, chalking, fading and/or adhesion.
3. 20 year material coverage.
4. Warranty shall commence on date of substantial completion.
5. Installer shall provide manufacturer with 5 year warranty covering roofing system installation and watertightness.

### PART 2 PRODUCTS

#### 2.1. STRUCTURAL STANDING SEAM METAL ROOF SYSTEM:

##### A. General

1. Whenever a particular make of material, trade name and/or manufacturer's name is specified herein, it shall be regarded as being indicative of the minimum standard of quality required. A bidder who proposes to quote on the basis of an alternate material and/or system will only be considered if the proposed alternate is submitted on time and is documented as being equivalent or superior in quality to the specified system as described in these specifications. Additionally, all manufacturer and contractor /fabricator guidelines must be met as specified.

##### B. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Garland Co., Inc. Basis of Design (Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.)
2. Other manufactures approved based on compliance with the specification:  
Tremco  
Approved equal
3. Any proposed systems must meet or exceed the following listed characteristics and be submitted for approval prior to bid opening. Additionally, all performance requirements listed in "Design Criteria" (Section 1.9) and Warranty Criteria (Section 1.10) must be met and submitted as well as all items listed in the Manufacturer's Qualifications (Section 1.5).

##### C. PANEL MATERIAL

1. Panel material: Panel material: 24 ga., Galvalume steel, type AZ-55, smooth as per ASTM A792-96.
2. Flashing and flat stock material: Fabricate in profiles indicated on drawings of same material, thickness, and finish as roof system, unless indicated otherwise.
3. Nominal width 16" for roof panel.



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### D. Finish on surfaces:

1. Exposed surfaces for coated steel sheet:
  - a. Two coat coil applied, baked-on full-strength (70% resin) fluorocarbon coating system (polyvinylidene fluoride, PVF2), applied by manufacturer's approved applicator.
  - b. Coating system shall provide nominal 1.0 mil dry film thickness, consisting of primer and color coat.
  - c. Color shall be selected by the Owner. Include cost to custom color match other adjacent finished metal products and/or Owner's color sample.

### E. Characteristics:

1. Configuration, Roofing: Standing seams incorporating mechanically interlocked, concealed anchor clips allowing unlimited thermal movement, and of configuration which will prevent entrance or passage of water.
  - a. Panel/Cap configuration must have a total of four (4) layers of steel surrounding anchor clip for prevention of water infiltration and increased system strength designed to limit potential for panel blow-off.
  - b. Profile of panel shall have mesa's every 1 1/2" o.c. continuous throughout panel which are a minimum of 1.5" wide. These will absorb thermal stresses, reduce oil canning in panel and increase load carrying capacity.
  - c. Exposed fasteners, screws and/or roof mastic are unacceptable and will be rejected. System configuration only allows for exposed fasteners at trim details (as per manufacturer's guidelines)
  - d. Panels must be furnished in continuous lengths from ridge to eave with no overlaps unless approved by manufacturer to length of run.
2. Seam must be 2-3/8" minimum height for added upward pressures and aesthetic appeal. Seam shall have continuous anchor reveals to allow anchor clips to resist positive and negative loading and allow unlimited expansion and contraction of panels due to thermal changes. Integral (not mechanically sealed) seams are not acceptable.
3. Concealed Anchor Clips: Clips must be 16 guage, 40,000 p.s.i. ONE (1) piece galvanized steel clip with projecting legs for additional panel alignment and provision for unlimited thermal movement in each direction along the longitudinal dimension. Batten Seam Style
  - a. Two-piece (2) clips are NOT acceptable.
  - b. Clip design must isolate sealant in panel cap from clip to insure that no sealant damage occurs from the clip during expansion and contraction.
  - c. Clip must maintain a clearance of a minimum of 3/8" between panel and substrate for proper ventilation to help prevent condensation on underside of panel and eliminate the contact of panel fastener head to panel.

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4. Seam cap: Snap-on cap shall be a minimum of 1" wide "T" shaped of continuous length up to 45 feet according to job condition and field seamed by means of manufacturer's standard seaming machine.
  - a. Cap shall be designed to receive continuous double bead of hot applied, foamed in place gasketing sealant which will not come in contact with the anchor clip to allow unlimited thermal movement of panel without damage to cap sealant.
  - b. Sealant shall be non-fatigue, nitrogen injected water barrier.
6. Standing Seam Panel Width: (16")
7. Stiffening ribs, mesas: Located in flat of panel to minimize oil canning and telegraphing of structural members.
8. Panel length: Full length without joints, including bends.
9. Replaceability: Panels shall be of a symmetrical design with snap on cap configuration such that individual panels may be removable for replacement without removing adjacent panels.
10. Panel ends shall be panned at ridge, headwall, and hip conditions where applicable.

### 2.2 ACCESSORY PRODUCTS:

- A. Sealant:
  1. Acceptable product (Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.):
    - a. Concealed Application : Tuff-Stuff.
    - b. Exposed Application : General Electric Co., SILGLAZE II 2800.
  2. Color shall be selected by the Owner. Include cost to custom color match other adjacent finished metal products and/or Owner's color sample.
- B. Pipe boots shall be provided by manufacture to fit around both round projections and angle iron projections and be covered under the terms of the warranty

### 2.3 FABRICATION:

- A. Shop fabricate metal roofing and flashing components to the maximum extent possible, forming metal work with clear, sharp, straight, and uniform bends and rises. Hem exposed edges of flashings.
- B. Form flashing components from full single width sheet in minimum 10'-0" sections. Provide mitered corners, joined using closed end pop rivets and joint sealant.

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- C. Fabricate roofing and related sheet metal work in accord with approved shop drawings and applicable standards.

### 2.4 SOFFIT

#### A. Materials.

1. Panel material: .032" thickness aluminum, 3105-H14 alloy, smooth as per ASTM B209-96.
2. Flashing and flat stock material: Fabricate from .032" thick aluminum in profiles indicated on drawings of same material and finish as soffit system, unless indicated otherwise.

#### B. Finish on surfaces:

1. Exposed surfaces for coated panels:
  - a. Two coat coil applied, baked-on full-strength (70% resin) fluorocarbon coating system (polyvinylidene fluoride, PVF2), applied by manufacturer's approved applicator.
  - b. Coating system shall provide nominal one point zero (1.0) mil dry film thickness, consisting of primer and color coat.
  - c. Color shall be selected by the Owner. Include cost to custom color match other adjacent finished metal products and/or Owner's color sample.
2. Unexposed surfaces for coated panels shall be baked-on polyester coating with .20 - .30 dry film thickness (TDF).

#### C. Characteristics:

1. Fabrication: Panels shall be factory roll-formed from the specified metal. Field rolled panels will not be allowed.
2. Configuration: Interlocking flush/flat seams incorporating concealed screw type fastener. Concealed clip systems are not acceptable.
3. Panel width: twelve (12) inch nominal.
4. Panel lengths: Full length without joints to the extent as is practical. For lengths which exceed twenty-five (25) feet, shorter panels may be butted end-to-end (no overlap). End joints shall be staggered.
5. Panels shall have one (1) V-groove mechanically formed reveal at the center of the pan.
6. All panels shall be vented.

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### D. Accessories:

1. Fasteners:
  - a. Concealed fasteners: Corrosion resistant steel screws, #10 x 1" long, pancake head, Phillips drive. Use self-drilling, self-tapping for metal substrate or A-point for plywood substrate.
  - b. Exposed fasteners: Series 410 stainless steel screws or one eighth (1/8) inch diameter stainless steel waterproof rivets. All exposed fasteners shall be factory painted to match the color of the soffit panels.
2. Provide all miscellaneous accessories for complete installation.
3. 3/4" high x 24 gauge (minimum) Galvalume steel furring hat sections to soffit structural substrate. Hat sections shall be installed perpendicular to panel seams, and shall be spaced 24" o.c. (maximum) to accommodate the panel fastener spacing given in section 3.2 C.

## 2.5 GUTTERS

### A. Materials.

1. Gutter material: .050" aluminum prefabricated and post painted to match roof panel.
2. Gutters are to be single piece lengths fabricated as required to meet the drainage capacity of the roof section.
3. Gutter brackets are to be a minimum 3/16" x 1" aluminum.
4. Gutters are to be supported by brackets spaced 36" on center. Gutters shall be further supported by spacers every 36" and spaced alternately with the brackets

## 2.6 UNDERLAYMENT

### A. Materials.

1. SBS modified self-adhering membrane reinforced with non-woven fiberglass mat for extra strength and durability. A non-abrasive polyester surface is required for use in metal applications.
  - a. Must be provided by the metal panel manufacturer

## 2.7 INSULATION MATERIALS

- A. No insulation to be included above roof decking.

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### 2.8 SNOW RETENTION SYSTEM

- A. Roof Attachment Clamps: Provide aluminum standing seam roof clamp. Carbon steel or plastic parts are not acceptable. No fastener penetrations of the roof membrane will be permitted. Clamp to attach to the standing seam will have two stainless steel set screws (3/8" minimum diameter) having rounded point. One clamp shall be installed per standing seam for each row. Color to match roof.
- B. Cross member: Extrusion with receptacle in face to provide for insert of color strip. Color strip is to be the same pre-finished material and originate from the same supplier as the roof panels. Cross member is to be continuous and include splice connectors to join adjacent sections, ensuring alignment and structural continuity. Cross member is attached to clamps using 3/8" diameter stainless steel bolts.
- C. Snow/ Ice Clips: "Snow Clips" are to be aluminum or stainless steel, with rubber "foot". Clip to attach to cross member and rest on panel flat, between panel seams to retard movement of snow/ice beneath cross member. Use one clip per panel.

### PART 3 - EXECUTION

#### 3.1 PREPARATION:

- A. Inspection: Examine the alignment and placement of the building structure and substrate. Correct any objectionable warp, waves or buckles in the substrate before proceeding with installation of the preformed metal roofing. The installed roof panels will follow the contour of the structure and may appear irregular if not corrected.
- B. Establish straight side and crosswise benchmarks.
- C. Use proper size and length fastener for strength requirements. Approximately 5/16" is allowable for maximum fastener head size beneath the panel.
- D. Rectangular Roofs shall be checked for square and straightness. Gable ends may not be straight; set a true line for the gable clips and flashing with stringline.
- E. Measure the roof lengthwise to confirm panel lengths, overhangs, coverage of flashings at eaves and ridges and verify clearances for thermal movement.
- F. Purlins must correspond with the clip spacings outlined in section 1.9B
- G. Pre-roofing conference: Prior to beginning metal roofing work, a pre-roofing conference shall be held to review work to be accomplished.
  - 1. Architect, Owner, contractor, metal roofing subcontractor, metal roofing system manufacturer's representative and all other subcontractors who have equipment penetrating roof or whose work involves access to roof shall be present.

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### 3.2 UNDERLAYMENT MEMBRANE INSTALLATION

- A. Prime roof deck with SA Primer. Allow primer to dry before proceeding with application.
- B. Starting at low point, position membrane into place and peel back release liner. Press membrane to substrate surface to activate adhesive backing. Roll surface of sheet to fully engage adhesive.
- C. Install subsequent rolls shingle fashion, rolling each sheet to promote adhesion. Particular attention is required at laps to ensure complete seal. Overlap end laps by 6" minimum, overlap side laps 3" minimum.

### 3.3 ROOFING AND FLASHING INSTALLATION:

- A. All details will be shown on manufacturer's shop drawings to successful bidder; install roofing and flashings in accordance with approved shop drawings and manufacturer's product data, within specified erection tolerances.
- B. Attach the 16 gauge one piece panel clips through a bearing plate when attaching through insulation with two fasteners per clip according to the proper spacing specified above. The clips are to be attached to the metal deck.
- C. Installation of Roof Panels: Roof panels can be installed by starting from either end and working towards the opposite end. Due to the symmetrical design of the specified panel system, it is also acceptable to start from the middle of the roof and work toward each end.
  - 1. A stainless steel pop rivet shall be secured through the anchor reveal of the panel leg and extend into the arms of the panel clip located at the ridge of the system. This is done at each arm of the clip along the ridge. The panel is then anchored at all three tabs of the clip.
    - a. Be sure to capture all drilling debris during this operation with a rag or cloth placed on the panels at the drilling operation.
  - 2. The seam caps are shipped with two rolls of factory applied hot melt sealant located inside the caps. To install the caps, hook one side of the cap over the panel edge and rotate over the opposite panel leg. For ease of installation, start at one end of the panel and work toward the opposite end.
  - 3. A hand crimping tool is used to crimp the cap around the top of two adjacent panels
  - 4. Caps shall then be permanently seamed with manufacturer's mechanical seamer.
- D. Limit exposed fasteners to extent indicated on shop drawings.
- E. Anchorage shall allow for temperature expansion/contraction movement without stress or elongation of panels, clips, or anchors. Attach clips to structural substrate using fasteners

## SECTION 07410 - PREFORMED METAL ROOFING

of size and spacing as determined by manufacturer's design analysis to resist specified uplift and thermal movement forces.

- F. Seal laps and joints in accordance with roofing system manufacturer's product data.
- G. Coordinate flashing and sheet metal work to provide weathertight conditions at roof terminations. Fabricate and install in accordance with standards of SMACNA Manual.
- H. Provide for temperature expansion/contraction movement of panels at roof penetrations and roof mounted equipment in accordance with system manufacturer's product data and design calculations.
- I. Installed system shall be true to line and plane and free of dents, and physical defects with a minimum of oil canning.
- J. Form joints in linear sheet metal to allow for 1/4" minimum expansion at 20'-0" o.c. maximum and 8'-0" from corners.
- K. At joints in linear sheet metal items, set sheet metal items in two 1/4" beads of butyl sealant. Extend sealant over all metal surfaces. Mate components for positive seal. Allow no sealant to migrate onto exposed surfaces.
- L. Remove damaged work and replace with new, undamaged components.
- M. All vent stacks must be a minimum of 10" above the finished roof surface. Do not use copper or other incompatible materials. Paint all metal stacks and copper counterflashing with manufacturer's recommended coating to prevent rust and other harmful byproducts from affecting panel finish.

### 3.4 SOFFIT INSTALLATION.

- A. All details will be shown on manufacturer's shop drawings to successful bidder; install soffit and flashings in accordance with approved shop drawings and manufacturer's product data, within specified erection tolerances.
- B. Prepare soffit for the installation of panels, including:
  - 1. Install all sheathing, framing, and/or furring members as indicated in this specification and bid documents.
  - 2. Install all insulation, vapor retarder, and/or air infiltration barriers as indicated in this specification and bid documents.
  - 3. Install all temporary water proofing materials as required in this specification and bid documents.
- C. Directly over the completed soffit substrate, install metal soffit panels. All panels will be fastened into the structural substrate with screw type fasteners at twenty-four (24) inches o.c. maximum spacing along each panel seam.
- D. Seal laps and joints in accordance with roofing system manufacturer's product data.

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- E. Coordinate flashing and sheet metal work to provide weathertight conditions at soffit terminations. Fabricate and install in accordance with standards of SMACNA Manual.
- F. Installed system shall be true to line and plane and free of dents, and physical defects. In light gauge panels with wide flat surfaces, some oil canning may be present. Oil canning does not affect the finish or structural integrity of the panel and is therefore not cause for rejection.
- G. Form joints in linear sheet metal to allow for one quarter (1/4) inch minimum expansion at twenty (20) feet zero (0) inch on-center maximum and eight (8) feet zero (0) inch from corners.
- H. At joints in linear sheet metal items, set sheet metal items in two (2) one quarter (1/4) inch beads of butyl sealant. Extend sealant over all metal surfaces. Mate components for positive seal. Allow no sealant to migrate onto exposed surfaces.
- I. Remove damaged work and replace with new, undamaged components.
- J. Touch up exposed fasteners using paint furnished by soffit panel manufacturer and matching exposed panel surface finish.
- K. Clean exposed surfaces of soffit and accessories after completion of installation. Leave in clean condition at date of substantial completion. Touch up minor abrasions and scratches in finish.

### 3.5 GUTTER INSTALLATION

- A. The gutter is to be installed as shown on the details. It is to be continuous length gutters up to 40' long. 10' gutters are not acceptable. Intermittent gutter joints are not acceptable
- B. See 2.5 Gutters for sizes of gutters and downspouts

### 3.6 SNOW RETENTION SYSTEM INSTALLATION

- A. Layout: Carefully lay out desired assembly locations true-to-line prior to installing clamps or Versa brackets. Clamps shall avoid panel attachment clips if the clip is a single piece design.
- B. Clamp Installation: Assemble set screws to clamp and clamp to seam following all manufacturers printed instructions. Both set screws are to be at the same side of clamp. When application relies upon tested load-to-failure values, manufacturer's minimum recommended set screw tension shall be randomly verified using calibrated torque wrench per manufacturer's instructions.
- C. System Installation: Install snow retention assemblies straight and true-to-line. Secure all color strip material to ColorGard per manufacturer's instructions. Join adjacent sections with splice pieces provided. Do not cantilever cross member more than 6" past the last clamp in an assembly.
- D. Fall Protection: Provide necessary fall and other hazard protection in accordance with OSHA regulations when installing snow retention assemblies.



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- E. Cleaning: Clean roof of any residual debris resulting from installation.

3.7 CLEANING AND PROTECTION:

- A. Remove protective film (if any) from exposed surfaces of metal roofing, promptly upon installation. Strip with care to avoid damage to finishes. Clean exposed surfaces of roofing and accessories after completion of installation. Leave in clean condition at date of substantial completion. Touch up minor abrasions and scratches in finish.
- B. Provide final protection in a manner acceptable to installer, which ensures metal roofing being without damage or deterioration at time of substantial completion.
- C. Touch up exposed fasteners using paint furnished by roofing panel manufacturer and matching exposed panel surface finish.

END OF SECTION



## SECTION 07415 - PREFORMED METAL WALL PANELS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION:

- A. Work described in this section includes preformed metal wall system complete with clips, perimeter and penetration flashing, closures, and trim.
- B. Wall panels are to be attached 24" on center to subframing installed over existing masonry wall.

#### 1.2 RELATED SECTIONS.

- A. Drawings and general provisions of the Contract, including General Supplementary Conditions and Specification Sections apply to this section.
- B. Related work specified elsewhere:
  - 1. Division 7 Section "Sheet Metal Flashing and Trim" for flashing not part of roofing and other sheet metal work.
  - 2. Division 7 Section "Modified Bituminous Membrane Roofing."
  - 3. Division 7 Section "Joint Sealants" for field-applied sealants.

#### 1.3 SUBMITTALS:

- A. Shop drawings: Show wall system with flashings and accessories in plan and elevation; sections and details. Include metal thickness' and finishes, panel lengths, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations; existing beam locations, purlin and girt locations, thermal expansion provisions and special supports. Indicate relationships with adjacent and interfacing work. Shop drawings must be completed by the metal panel manufacturer's engineering department. Any and/or all changes recommended by the successful bidder must be approved by the manufacturer in writing prior to submittal.
- B. Product Data: Include manufacturer's detailed material and system description, sealant and closure installation instructions, engineering performance data and finish specifications.
- C. Color samples for initial color selection from the manufacturer's standard and premium colors. Color shall be selected by the Owner. Include cost to custom color match other adjacent finished metal products and/or Owner's color sample.
- D. Design test reports:
  - 1. Independent laboratory testing report for system design load and seam integrity.
  - 2. Professional engineer's documentation that panel system incorporates sufficient allowance for stress and movement.
  - 3. A letter from an officer of the manufacturing company certifying that the materials furnished for this project are the same as represented in tests and supporting data.

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4. Manufacturer's verifications that the panels are factory roll formed.
5. ASTM E108 or similar evidence of Class A Fire Resistance
6. ASTM E283 Test results must clearly demonstrate compliance with the performance requirements specified in article 1.9.ASTM E331 Test Report
7. ASTM E330 Test results must clearly demonstrate compliance with the performance requirements specified in article 1.9.
8. ASTM E331 Test results must clearly demonstrate compliance with the performance requirements specified in article 1.9.

### 1.4 INSTALLER QUALIFICATIONS:

- A Engage an experienced metal roofing contractor (erector) to install metal wall system who has a minimum of three (3) years experience specializing in the installation of structural standing seam metal roof systems.
- B Contractor must be certified by manufacturer specified as supplier of wall panel system and obtain written certification from manufacturer that installer is approved for installation of specified system. If requested, contractor must supply owner with a copy of this certification.
- C Successful contractor is required to maintain a full-time supervisor/foreman who is on the job-site at all times during installation of new roof system. Foreman must have a minimum of five (5) years experience with the installation of system similar to that specified.
- D Successful contractor must obtain all components of roof system from a single manufacturer including any roll good materials if required. Any secondary products that are required which cannot be supplied by the specified manufacturer must be recommended and approved in writing by primary manufacturer prior to bidding.
- E If required, fabricator/installer shall submit work experience and evidence of adequate financial responsibility. The owners representative reserves the right to inspect fabrication facilities in determining qualifications.

### 1.5 MANUFACTURERS QUALIFICATIONS / ALTERNATE MANUFACTURERS:

- A. The materials outlined in the Material and Method Specifications are the type of materials to be used on this project. Bidder will not be allowed to supply panels formed at the job-site on portable rollformers; metal panels must be pre-manufactured and engineered for this project. Bidder will not be allowed to change materials after the bid opening date. If the bidder wishes to propose an alternate manufacturer and/or material than that specified, the following manufacturer criteria must be submitted with the bid.
  1. Submit certified test reports from a testing laboratory that bear the stamp of a registered P.E. to show compliance with specified performance criteria.
  2. Tests shall have been made for identical systems within the ranges of specified performance criteria.
  3. Empirical calculations for roof performance shall only be acceptable for positive loads.
  4. Indicate fastener types and spacings and provide fastener pullout values.

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5. A list of a minimum of five (5) jobs where the proposed alternate material was used under similar conditions. The reference list shall include date of project, size of project, address and contact telephone number.
6. A written statement from the manufacturer stating that they will provide the building owner with a daily site inspection for a minimum of one (1) hour by an experienced, full time employee of the company.
7. A copy of manufacturer's warranty covering both material and labor.

B. The following samples must be submitted by alternate manufacturers:

1. Submit sample of panel section, at least 6" x 6" showing seam profile and also a sample of color selected.
2. Submit sample of panel clip.
3. Submit sample of purlin (Z) and/or bearing plate.
4. Submit sample of base sheet, roll goods and/or mastics.

### 1.6 DELIVERY, STORAGE, AND HANDLING:

A. Manufacturer's responsibility:

1. Protect components during fabrication and packing from mechanical abuse, stains, discoloration, and corrosion.
2. Provide protective interleaving between contact areas of exposed surfaces to prevent abrasion during shipment, storage, and handling.

B. Installer's responsibility:

1. Store materials off ground providing for drainage; under cover providing for air circulation; and protected from wind movement, foreign material contamination, mechanical damage, cement, lime or other corrosive substances.
2. Handle materials to prevent damage to surfaces, edges and ends of roofing sheets and sheet metal items. Damaged material shall be rejected and removed from the site.
3. Protect panels from wind-related damages.
4. Inspect materials upon delivery. Reject and remove physically damaged or marred material from project site.

### 1.7 JOB CONDITIONS:

A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for preformed metal roofing system.

B. Protection:

1. Provide protection or avoid traffic on completed roof surfaces.
2. Do not overload roof with stored materials.
3. Support no roof-mounted equipment directly on roofing system.

C. Ascertain that work of other trades which penetrates the wall or is to be made watertight by the wall panel is in place and approved prior to installation of roofing.

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1.8 DESIGN AND PERFORMANCE CRITERIA:

A. Thermal Expansion and Contraction:

1. Completed metal wall panel and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.
2. The design temperature differential shall be not less than 200 °F.
3. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.

B. Uniform wind load capacity:

1. Installed wall panel system shall withstand negative design wind loading pressures complying with the following criteria. Anchor clips shall be installed exactly as spacing given in article 3.0.
  - a. Design Code: ASCE 7-16, Method 2 for Components and Cladding.
  - b. Provide panel system manufacturer's calculations for wind uplift certifying that attachment method will withstand uplift pressures specific to this project.
2. Capacity shall be determined using uniform static air pressure method in accordance with ASTM E330. Allowable safe working loads shall be determined by dividing the ultimate test load by the safety factor specified above.

C. ASTM E283: Static pressure air infiltration (doors, windows, curtain walls):

1. Pressure Leakage Rate

- a. 1.57 PSF 0.0033 cfm/sq.ft.
- b. 6.24 PSF 0.0056 cfm/sq.ft.
- c. 12.0 PSF 0.062 cfm/sqft.
- d. 15.0 PSF 0.064 cfm/sqft
- e. 20.0 PSF 0.074 cfm/sq.ft.

D. ASTM E331: Static pressure water infiltration (doors, windows, curtain walls):

Pressure Result:

5 Gal./Hr. per S.F. and Static No Leakage

Pressure of 20.0 Psf for 15 minutes.

1.10 WARRANTIES:

A. Owner shall receive warranty from manufacturer wall panels covering all of the following criteria. Multiple warranties are not acceptable.

1. Manufacturer's 10 year limited watertight warranty.

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2. 20 year coverage on finish including checking, crazing, peeling, chalking, fading and/or adhesion.
3. Installer shall provide manufacturer with 2 year warranty covering roofing system installation and watertightness.
4. Warranties shall commence on date of Final Acceptance

### PART 2 PRODUCTS

#### A. METAL WALL PANEL SYSTEM:

1. Whenever a particular make of material, trade name and/or manufacturer's name is specified herein, it shall be regarded as being indicative of the minimum standard of quality required. A bidder who proposes to quote on the basis of an alternate material and/or system will only be considered if the proposed alternate is submitted on time and is documented as being equivalent or superior in quality to the specified system as described in these specifications. Additionally, all manufacturer and contractor fabricator guidelines must be met as specified.
  - a) The Garland Company, Inc.
  - b) Approved equal
2. Product names for the metal roof panel system and waterproofing materials used in this section shall be based on performance requirements from materials manufactured by The Garland Company, and form the basis of the contract documents. The Basis of Design is: R-MER Wall Pan System by the Garland Company. Any proposed alternate systems must meet or exceed the following listed characteristics and be submitted for during the Shop Drawing Submission process. Additionally, all performance requirements listed in "Design Criteria" (Section 1.9) and Warranty Criteria (Section 1.10) must be met and submitted as well as all items listed in the Manufacturer's Qualifications (Section 1.5).

#### B. WALL PANEL MATERIAL

1. Panel material: Panel material: 24 gauge galvalume coated steel, type AZ-55, grade 50 B smooth as per ASTM A792-96.
2. Flashing and flat stock material: Fabricate in profiles indicated on drawings of same material, thickness, and finish as roof system, unless indicated otherwise.
3. Nominal width 12" for wall panel.

#### C. Finish on surfaces:

1. Exposed surfaces for coated steel:
  - a. Two coat coil applied, baked-on full-strength (70% resin) fluorocarbon coating system (polyvinylidene fluoride, PVF2), applied by manufacturer's approved applicator.

## SECTION 07415 - PREFORMED METAL WALL PANELS

- b. Coating system shall provide nominal 1.0 mil dry film thickness, consisting of primer and color coat.
  - c. Provide a post coated clear coat application to protect against fade, chalking and other discoloration.
  - d. Color shall be selected by the Owner. Include cost to custom color match other adjacent finished metal products and/or Owner's color sample.
- D. Characteristics:
- 1. Fabrication: : Panels shall be factory roll-formed from the specified metal. Field rolled panels will not be allowed.
  - 2. Configuration: Interlocking flush/flat seams incorporating concealed anchor clips. Through fastened or exposed fastener systems are not acceptable.
  - 3. Panel seam legs shall be one and one half (1 1/2) inch nominal concealed depth behind the panel face. Seam shall allow for expansion and contraction of panels due to thermal changes.
  - 4. Anchor clips: Clips shall be 22 gauge galvalume steel designed to allow thermal movement of the panel in each direction along the longitudinal dimension.
  - 5. Panel Width (Seam Spacing): 12" nominal.
  - 6. Panel lengths: Full length without joints to the extent as is practical.
  - 7. Stiffening ribs, mesas: Located in flat of panel to minimize oil canning and telegraphing of structural members.
- E. Accessories:
- 1. Fasteners:
    - a. Concealed fasteners: Corrosion resistant stainless steel screws, #10 x 1" long, pancake head, Phillips drive. Use self-drilling, self-tapping for metal substrate.
    - b. Exposed fasteners: Series 410 stainless steel screws or one eighth (1/8) inch diameter stainless steel waterproof rivets. All exposed fasteners shall be factory painted to match the color of the wall panels.
  - 2. Underlayment:
    - a. Provide water resistive barrier installed behind wall panels system as recommended by metal panel manufacturer: Intelliwrap SA, 25-mil, 3-layer, water-tight and vapor permeable self-adhesive membrane.
  - 3. Provide all miscellaneous accessories for complete installation, including primer for wall surface. SA Primer or approved equal.



## SECTION 07415 - PREFORMED METAL WALL PANELS

### PART 3 EXECUTION

#### 3.1 PREPARATION

- A. Inspect the walls to verify integrity. Install hat sections coplaner and plum on walls

#### 3.2 WALL PANEL INSTALLATION.

- A. All details will be shown on manufacturer's shop drawings to successful bidder; install panels and flashings in accordance with approved shop drawings and manufacturer's product data, within specified erection tolerances.
- B. Prepare wall for the installation of panels, including:
1. Install continuous underlayment membrane required by roofing system manufacturer.
    - a. Apply SA Primer to wall surface at 1/3 to 1/2 gallon per 100 sq. ft., allow minimum 2 hours to dry tack-free. Surface must be covered within 48 hours or re-primed.
    - b. Seal openings or cracks greater than 1/4" with Intelliwrap Multiband adhesive tape
    - c. Install Intelliwrap SA membrane over substrate. Position membrane on wall and remove split-release liner to adhere to substrate. Ensure full contact of membrane to wall surface and seal lap between courses of membrane.
  2. Install hat channels no more than 24" on center. Attach purlins with expanding masonry anchors, 24" on center on top and bottom of hat channel, with 12" stagger between top and bottom fasteners.
- C. Directly over the framing system, install metal wall panels. All panels will be fastened into the hat sections with concealed anchor at 24" o.c. maximum spacing along each panel seam.
- D. Seal laps and joints in accordance with roofing system manufacturer's product data.
- E. Coordinate flashing and sheet metal work to provide weathertight conditions at panel terminations. Fabricate and install in accordance with SMACNA Manual standards.
- F. Installed system shall be true to line and plane and free of dents, and physical defects. In light gauge panels with wide flat surfaces, some oil canning may be present. Oil canning does not affect the finish or structural integrity of the panel and is therefore not cause for rejection.
- G. Form joints in linear sheet metal to allow for 1/4" minimum expansion at 20'-0" o.c. maximum and 8'-0" from corners.

## SECTION 07415 - PREFORMED METAL WALL PANELS

- H. At joints in linear sheet metal items, set sheet metal items in two 1/4" beads of butyl sealant. Extend sealant over all metal surfaces. Mate components for positive seal. Allow no sealant to migrate onto exposed surfaces.
- I. Remove damaged work and replace with new, undamaged components.
- J. Touch up exposed fasteners using paint furnished by wall panel manufacturer and matching exposed panel surface finish.
- K. Clean exposed surfaces of panels and accessories after completion of installation. Leave in clean condition at date of substantial completion. Touch up minor abrasions and scratches in finish.

### 3.3 CLEANING AND PROTECTION:

- A. Remove protective film (if any) from exposed surfaces of metal wall panels, promptly upon installation. Strip with care to avoid damage to finishes. Clean exposed surfaces of wall panels and accessories after completion of installation. Leave in clean condition at date of substantial completion. Touch up minor abrasions and scratches in finish.
- B. Provide final protection in a manner acceptable to installer, which ensures metal wall panels being without damage or deterioration at time of substantial completion.
- C. Touch up exposed fasteners using paint furnished by metal wall panel manufacturer and matching exposed panel surface finish.

END OF SECTION

## SECTION 07530 – EPDM ROOF

### 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. “Or Approved Equal” Roof System: The Contractor will use the system described under Part 2 product section ensure the physical characteristics of the submitted product meet the requirements of the specification.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. JM EPDM NR FIT Fully adhered roof system or Firestone RubberGard Platinum™ Fully Adhered Roofing System or approved equal.
  - 2. Roof expansion assemblies.
  - 3. Roofing Insulation.
  - 4. Cover Board
  - 5. Roof flashings and counter flashings.
  - 6. .090 non-reinforced EPDM roof membrane
  - 7. Walkways.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. General: Install a watertight, modified bituminous membrane roofing and base flashing system with compatible components that will not permit the passage of liquid water and will withstand wind loads, thermally induced movement, and exposure to weather without failure.
  - 1. Roofing system shall comply with the following:
    - a. 100 mile per hour wind speed in 3 second gusts.
    - b. IBC 2018 building code compliance, NJ edition

#### 1.4 SUBMITTALS

Provide one complete roof system shop drawing with an index, table of contents, and all related products.

- A. Product Data: For each type of roofing product specified. Include data substantiating that materials comply with requirements.
- B. Shop Drawings: Include plans, sections, details, and attachments to other work, for the following:
  - 1. Base flashings and membrane terminations.
  - 2. Flat and tapered insulation, including finished slopes at a minimum ¼” per foot.
  - 3. Crickets, saddles, and tapered edge strips, including slopes.

## SECTION 07530 – EPDM ROOF

- C. Samples for Verification: Of the following products:
  - 1. 12-by-12-inch (300-by-300-mm) square of non-reinforced EPDM
  - 2. 12-by-12-inch (300-by-300-mm) square of roofing insulation.
  - 3. 12-by-12-inch (300-by-300-mm) square of walkway pads.
  - 4. 6 insulation fasteners of each type, length, and finish.
  - 5. Flashing and counter flashing.
- D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, and licensed by manufacturer to install specified roofing system and is eligible to receive the no dollar limit roofing manufacturer's warranty.
- E. Manufacturer Certificates: Signed by roofing system manufacturer certifying that the roofing system complies with requirements specified in the "Performance Requirements" Article. Upon request, submit evidence of complying with requirements.
- F. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- G. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of components of roofing system with requirements based on comprehensive testing of current product compositions.
- H. Research/Evaluation Reports: Evidence of roofing system's compliance with building code in effect for Project from a model code organization acceptable to authorities having jurisdiction.
- I. Maintenance Data: For roofing system to include in the maintenance manuals specified in Division 1.
- J. Warranty: Sample copy of no dollar limit roofing manufacturer's warranty stating obligations, remedies, limitations, and exclusions of warranty. Provide sample of the Installer's Warranty.
- K. Inspection Report: Copy of roofing system manufacturer's inspection report and a qualified independent testing agency's report of completed roof installation.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to perform Work of this Section who has specialized in installing roofing similar to that required for this Project; who is approved, authorized, and licensed by the roofing system manufacturer to install manufacturer's product; and who is eligible to receive the no dollar limit roofing manufacturer's warranty.

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- B. Roofing System Design: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7.
  - 1. Corner Uplift Pressure: 52.6 lbf/sq. ft. (kPa/sq. m).
  - 2. Perimeter Uplift Pressure: 33.8 lbf/sq. ft. (kPa/sq. m).
  - 3. Field-of-Roof Uplift Pressure: 18.8 lbf/sq. ft. (kPa/sq. m).
  
- C. Pre-installation Conference: Before installing roofing system, conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." Notify participants at least 5 working days before conference.
  - 1. Meet with Owner; Construction Manger; Architect; Owner's insurer, if applicable; testing and inspecting agency representative; roofing installer; roofing system manufacturer's representative; deck installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
  - 2. Review methods of removing the existing roofing and cover board. Examine existing roof deck structure, slope and area of replacing roofing for daily output.
  - 3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
  - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and attachment to structural members.
  - 5. Review loading limitations of deck during and after roofing.
  - 6. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.
  - 7. Review governing regulations and requirements for insurance, certifications, and inspection and testing, if applicable.
  - 8. Review temporary protection requirements for roofing system during and after installation.
  - 9. Review roof observation and repair procedures after roofing installation.
  - 10. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.
  - 11. Review all roofing openings, sizes, location, curb or post supports.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weather tight location to ensure no significant moisture pickup and maintain at a temperature exceeding roofing system manufacturer's written instruction. Store membrane and other sheet materials on pallets or other raised surfaces under a waterproof cover.
  - 1. Handle and store roofing materials and place equipment in a manner to avoid significant or permanent damage to deck or structural supporting members.
  
- B. Do not leave unused membrane and other sheet materials on the roof overnight or when roofing work is not in progress unless protected from weather and moisture and unless maintained at a temperature exceeding 50 deg F (10 deg C).

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- C. Deliver and store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.
- D. Protect roofing insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
  - 1. Insulation shipping wrap is not weather protection. Provide additional weather protection of insulation materials complying to manufacturer's written instruction and PIMA technical bulletin # 109.

### 1.7 INSTALLER QUALITY ASSURANCE

- A. The Owner has determined that it would be in the best interest of this particular project, and reasonably related to the specific work to be performed, that all bidders be required to participate in an approved apprenticeship program pursuant to standards established under the Department of Wage and Industry Act of 1948 (N.J.S.A. 34:1A-34 et. seq. Please fill out and include the "Apprenticeship Form for Construction Projects" which is included in the Specifications with your Bid Documents.
- B. The EPDM membrane roofing system must achieve a UL Class A.
- C. Materials: All materials and adhesives must comply with New Jersey and local requirements limiting volatile organic compounds (VOC).
- D. The manufacturer must have a minimum of 30 years experience in the manufacturing of vulcanized thermal set sheeting.
- E. Unless otherwise noted in this specification, the roofing contractor must strictly comply with the manufacturer's current specifications and details.
- F. The roofing system must be installed by an applicator authorized and trained by the manufacturer in compliance with shop drawings as approved by the manufacturer. The roofing applicator shall be thoroughly experienced and upon request be able to provide evidence of having at least five (5) years successful experience installing single-ply EPDM roofing systems and having installed at least one (1) roofing application or several similar systems of equal or greater size within one year.
- G. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and experienced superintendent on the job at all times roofing work is in progress.
- H. There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the specifier. Any deviation from the manufacturer's installation procedures must be supported by a written certification on the manufacturer's letterhead and presented for the specifier's consideration.

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- I. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the building owner seventy-two (72) hours prior to the manufacturer's final inspection.
- J. The roofing system manufacturer will provide, when the project is in progress, the following:
  - 1. Keeping the Owner informed as to the progress and quality of the work as observed.
  - 2. Provide job site inspections a minimum of four days per week.
  - 3. Reporting to the Owner in writing, any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
  - 4. Confirming, after completion of the project and based on manufacturer's observations and tests, that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported.

1.8 JOB CONDITIONS, CAUTIONS AND WARNINGS

- A. Refer to the manufacturer's requirements. JM EPDM Application Guide for a 30-year no dollar limit Peak Advantage Guarantee or Firestone's Application Guide for 30 Platinum warranty design requirements. Approved equal manufacturer's will be considered in accordance with Specification Section 01300 – Submittals.
- B. Material Safety Data Sheets (MSDS) must be on location at all times during the transportation, storage and application of materials.
- C. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.
- D. When loading materials onto the roof, the Manufacturer's Licensed Contractor must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.
- E. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.
- F. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage.
- G. Provide protection, such as 3/4 inch thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters. Blue EPS board may be used In lieu of plywood.

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- H. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.
- I. New roofing shall be complete and weathertight at the end of the work day.
- J. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

### 1.9 WARRANTY

- A. **Roofing Manufacturer's Warranty:** Provide a 30-year no dollar limit leak proof labor and material warranty by the roofing manufacturer from the date of substantial completion following approval by the roof manufacturer's agent. The single source warranty shall include all roofing system products, all edge/coping metal products and all wall panels. The maximum wind speed coverage shall be peak gusts of 100 mph measured at 10 meters above ground level. Certification is required with the shop drawing submittal indicating the manufacturer has reviewed and agreed to such wind coverage. Warranty shall also include Manufacturer's coverage for accidental puncture for the duration of the 30 year warranty.
- B. **Installer's Warranty:** Submit installer's warranty letter, signed by the Installer, covering work of this section, including all roofing system components and all metal components for two (2) years from the date of Substantial Completion following approval by the roof manufacturer's agent.
- C. Pro-rated System Warranties shall not be accepted.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. All components of the specified roofing system shall be products of Johns Manville (JM) or Firestone Building Products, LLC (Firestone) or approved equal.
- B. Unless otherwise approved by the specifier and accepted by the membrane manufacturer, all products (including insulation, fasteners, fastening plates and edgings) must be **manufactured and supplied** by the roofing system manufacturer and covered by the warranty.

### 2.2 MEMBRANE

- A. Furnish JM EPDM NR 90 mil - FIT non-reinforced EPDM or Firestone RubberGard 90 mil RubberGard Platinum™ Non-Reinforced EPDM. (Ethylene, Propylene, Diene Terpolymer) in the largest sheet possible. The membrane shall conform to the minimum physical properties of ASTM D4637, type 1. When a 10 foot wide membrane is to be used, the membrane shall be manufactured in a



## SECTION 07530 – EPDM ROOF

single panel with no factory splices to reduce splice intersections. Approved equal manufacturers will be considered in accordance with Specification Section 01300 – Submittals.

### 2.3 INSULATION MATERIALS

- A. General: Provide preformed, roofing insulation boards that comply with requirements, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: Rigid, cellular Polyisocyanurate thermal insulation complying with ASTM C 1289, Class 1, Grade 2 (20 PSI) classified by facer type as follows:
  - 1. Facer Type: Type II, felt or glass-fiber mat on both major surfaces. Finished slope is to be 1/4":12"  
Minimum thickness drains 3.5".
  - 2. Minimum long term thermal resistance (LTTR): 5.7 per inch determined in accordance with CAN/ULC 770 @ 75 degrees F.
  - 3. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated or required for sloping to drain. No standing water shall be permitted and the Contractor shall provide this insulation as necessary.
- C. Cover Board: ASTM C 1289, Type II, Class 4, Grade 1. 1/2" High-Density Polyisocyanurate Foam Core, or manufacturer's approved cover board for the roof system.
  - 1. Product: JM ProtectoR HD, 1/2" High-Density Polyiso Cover Board, Firestone 1/2" ISO Guard or approved equal.

### 2.4 ADHESIVES AND CLEANERS

All products shall be furnished by Johns Manville (JM) or Firestone Building Products, LLC (Firestone) or approved equal and specifically formulated for the intended purpose.

- A. Bonding Adhesive: JM LVOC Membrane Adhesive or Firestone Single Ply LVOC Bonding Adhesive (or approved equal).
- B. Splicing Cement: Splice Adhesive
- C. Splice Tape and Primer: JM EPDM 4" Seam Tape Plus with Tape Primer (Low VOC) or Firestone QuickSeam 3" Tape and LVOC QuickPrime+ (or approved equal).
- D. Cleaning Solvent: JM Weathered Membrane Cleaner or Firestone Clear Splice Adhesive (or approved equal).
- E. External seam sealant: JM Single-ply LVOC caulk or Firestone Lap Sealant (or approved equal).

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- F. Sealer: Pourable Sealer
- G. Reinforced Termination Strip: JM EPDM reinforced termination strip with tape (RTS) (or approved equal).

### 2.5 FASTENERS AND PLATES

To be used for mechanical attachment of insulation and to provide additional membrane securement:

- A. Insulation Fastening Plates: a 3 inch diameter FM approved metal plate used for insulation attachment in conjunction with Heavy Duty Fastener must achieve a minimum pullout of 300 pounds for fully adhered roof systems. Comply with manufacturer's recommendations for minimum quantity of pull out tests.
- B. Seam Fastening Plates: A 2 inch diameter FM approved metal plate meeting corrosion resistance provisions in FMG 4470, designed for fastening membrane to substrate and acceptable to the membrane roof system manufacturer.
- C. QuickSeam RPF Strip: a 6 inch wide, 100 foot long strip of RubberGard reinforced EPDM membrane.

The 6 inch wide QuickSeam shall be utilized horizontally or vertically (in conjunction with Seam Fastening Plates) below the EPDM membrane for additional membrane securement.

### 2.6 METAL EDGING AND MEMBRANE TERMINATIONS

- A. JM Presto-Tite Edge One Fascia or Firestone AnchorGard (or approved equal): a metal fascia system with an extruded aluminum anchor bar and 0.050 inch thick aluminum fascia. Metal fascia color shall be as designated by the Owner's Representative or to match existing.
- B. JM Presto-Lock Coping or Firestone Coping (or approved equal): incorporates a 20 gauge galvanized steel anchor clips with 4 , a concealed joint cover and 10 foot continuous sections of coping cap. Metal coping cap color shall be as designated by the Owner's Representative.
- C. Manufacturer's Termination Bar: a 1 inch wide and .106 inch thick extruded aluminum bar pre-punched 6 inches on center; incorporates a sealant ledge to support AP Sealant and provide increased stability for membrane terminations.
- D. All metal coping / edge system to meet ANSI / SPRI ES-1 wind design standard.

### 2.7 WALKWAYS

- A. Protective surfacing for roof traffic shall be provided by the manufacturer, factory formed, nonporous, heavy duty, slip resistant surface textured walkway

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pads sourced from the roofing system manufacturer. The pad shall be installed in accordance with the manufacturer's installation requirements to resist wind blow off. Provide walk pads from the roof access point or hatch to each mechanical unit and around each mechanical unit in accordance with the equipment service requirements.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions under which roofing will be applied, with Installer present, for compliance with requirements.
- B. Verify that roof openings and penetrations are in place and set and braced and that roof drains are properly clamped into position.
- C. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at roof penetrations and terminations and match the thicknesses of insulation required.
  - 1. Verify that wood nailer strips are located perpendicular to roof slope and are spaced according to requirements of roofing system manufacturer.
- D. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch (1.5 mm) out of plane.
- E. Verify that all abandoned equipment, dunnage, vents, pipes, pitch pockets, etc. have been removed and the deck patched.

#### 3.2 PREPARATION

- A. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast. Verify that all roof drains are connected to roof drainage system.
- B. Inspect the deck to verify integrity. Bring any areas of questionable integrity to the Architect's attention. Do not cover any areas of questionable welds or deck out of plane.

#### 3.3 INSULATION AND COVER BOARD INSTALLATION

- A. Comply with roofing system manufacturer's written instructions for installing roofing insulation. Do not install more cover board than can be covered with roofing material the same day.
- B. Comply with membrane roofing system manufacture written instructions for installing insulation.
- C. Install insulation with long joints of insulation in continuous straight lines with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.

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1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- D. Install new tapered insulation crickets where designated but between all drains and scuppers.
- E. Mechanically fasten common fastener through tapered insulation system and base layer insulation to roof deck using proper manufactures fasteners.
  1. Fasten at the rate of 16 fasteners per 4'x 8' in the field of the roof, 24 fasteners per 4'x 8' in the perimeter of the roof and 32 fasteners per 4'x 8' in the corner of the roof.
- F. Adhere Cover board: Install cover board and secure to tapered system insulation using twin pack adhesive.
  1. Adhere the bead spacing at the rate of 12" apart in the field for a 4' x 4" board, 6" apart in the perimeter for a 4' x 4' board and 4" apart in the corner for a 4' x 4' board on the roof

### 3.4 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install roofing membrane in accordance with roofing system manufacturer's written instructions, applicable recommendations of the roofing manufacturer and requirements in this Section.
- B. Where roof slope exceeds 1/2 inch per 12 inches (1:24), contact the membrane manufacturer for installation instructions regarding installation direction and backnailing.
- C. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.
- D. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is imminent.
  1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.
  2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
  3. Remove and discard temporary seals before beginning work on adjoining roofing.

### 3.5 MEMBRANE PLACEMENT AND BONDING

- A. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour before bonding. Fold the sheet back onto itself so half the underside of the membrane is exposed.

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- B. Apply the Bonding Adhesive in accordance with the manufacturer's published instructions, to both the underside of the membrane and the substrate. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
  - 1. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded half of the membrane sheet with a soft bristle push broom to achieve maximum contact.
  - 2. Fold back the unbonded half of the membrane sheet and repeat the bonding procedure.
- C. Install adjoining membrane sheets in the same manner, overlapping edges approximately 4 inches. Do not apply bonding adhesive to the splice area.

### 3.6 MEMBRANE SPLICING (Factory Applied Tape Splice)

- A. Overlap adjacent sheets and mark a line out from the top sheet as recommended by roof manufacturer.
- B. Fold the top sheet back and clean the dry splice area of membrane sheet with Sure-Seal Primer as required by the membrane manufacturer.
- C. Position 4" JM Tape to bottom sheet with the edge of the release film along the marked line. Press tape onto the sheet using hand pressure. Overlap tape roll ends a minimum of 1 inch.
- D. Install additional 6" EPDM Peel & Stick Sealing Strip over seam as outlined in the manufacturer's 30 year detail requirements.
- E. Remove the release film and press the top sheet onto the tape using hand pressure.
- F. Roll the seam toward the splice edge with a 2 inch wide steel roller.

### 3.7 FLASHING

- A. Wall and curb flashing shall be cured EPDM membrane. Mechanically fasten 6" wide Strip at 12" on center in accordance with manufacturer's recommendations. Continue the deck membrane as wall flashing where practicable.
- B. Follow manufacturer's Platinum flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

### 3.8 WALKWAYS

- A. Install walkways at all traffic concentration points such as roof hatches, access doors, rooftop ladders, etc. Provide walk pads from the roof access point or hatch to each mechanical unit and around each mechanical unit in accordance with the equipment service requirements.

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- B. Install walk pads to the EPDM membrane in accordance with the manufacturer's requirements to resist wind blow-off.

### 3.9 DAILY SEAL

- A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the workday, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
- B. Manufacturer's Pourable Sealer or other acceptable membrane seal in accordance with the manufacturer's requirements.

### 3.10 PROTECTION AND CLEANING

- A. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.
- B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.
- C. Protect roofing system from damage and wear during remainder of construction period.
- D. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- E. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

### 3.11 FIELD QUALITY CONTROL

- A. The roofing contractor shall employ and pay for a qualified inspection agent for daily inspection work for this project, **3 days per week minimum or daily as required for the warranty to be provided**. A weekly report shall be emailed weekly to the CM, Architect and Owner for their records. See Specification Section 01400, Quality Control for details.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to the CM, Architect and Owner.
  - 1. Notify Construction Manager (if applicable), Architect and Owner 48 hours in advance of the date and time of inspection.
- C. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

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

3.13 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS <NAME> of <ADDRESS>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner:
2. Address:
3. Building Name/Type:
4. Address:
5. Area of Work: As per the Construction Documents.
6. Acceptance Date:
7. Warranty Period: Thirty (30) years
8. Expiration Date:

- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

- D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
  - a. lightning;
  - b. peak gust wind speed exceeding 100 mph;
  - c. fire;
  - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
  - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
  - f. vapor condensation on bottom of roofing; and
  - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof has been paid by Owner or by another responsible party so designated.

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3. The Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents, resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void, unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. The Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

END OF SECTION 07530



## SECTION 07620 - SHEET METAL FLASHING AND TRIM

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Conditions of the Contract and Division 01 Specification Sections apply to this section.

#### 1.2 SUMMARY

- A. Provide all labor, equipment, and materials to fabricate and install the following.
  - 1. Edge strip and flashing.
  - 2. Fascia, scuppers, and trim.
  - 3. Expansion joint and area divider covers.
  - 4. Edge Metal: Coping Cap and Fascia.
  - 5. Downspouts

#### 1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
  - 1. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc-Iron Alloy-Coated (galvannealed) by the Hot-Dip Process.
  - 2. ASTM A792 Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip Process.
  - 3. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 4. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 5. ASTM D692 Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.
- B. Warnock Hersey International, Inc., Middleton, WI (WH)
- C. Factory Mutual Research Corporation (FMRC)
- D. Underwriters Laboratories (UL)
- E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
  - 1. Architectural Sheet Metal Manual
- F. National Roofing Contractors Association (NRCA).
  - 1. Roofing and Waterproofing Manual
- G. Single Ply Roofing Institute (SPRI).

## SECTION 07620 -SHEET METAL FLASHING AND TRIM

1. Wind Design Guide for Use with Low Slope Roofing

### 1.4 SUBMITTALS FOR REVIEW

- A. Product Data:
  1. Provide manufacturer's specification data sheets for each product.
  2. Metal material characteristics and installation recommendations.
  3. Submit color chart prior to material ordering and/or fabrication so that equivalent colors to those specified can be approved.
- B. Samples: Submit two (2) samples, illustrating typical metal edge, coping, gutters, fascia extenders for material and finish.
- C. Shop Drawings:
  1. For manufactured and shop fabricated gravel stops, fascia, scuppers, and all other sheet metal fabrications.
  2. Indicate material profile, jointing pattern, jointing details, fastening methods, flashing, termination's, and installation details.
  3. Indicate type, gauge and finish of metal.
- D. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner.

### 1.5 SUBMITTALS FOR INFORMATION

- A. Design and Test Reports: Provide the following certified test reports from an independent testing laboratory:
  1. Independent laboratory testing report for system design load and seam integrity.
  2. Professional engineer's documentation that system incorporates sufficient allowance for stress and movement.
  3. A letter from an officer of the manufacturing company certifying that the materials furnished for this project are the same as represented in tests and supporting data.
  4. Manufacturer's verifications that the panels are factory roll-formed.
  5. UL 1897: Test report must be submitted for windstorm rating no less than that specified in Design and Performance Criteria article. The proposed roof system must have approval over specified substrate with steel framing spaced no further apart than as specified.
- B. Mill production reports certifying that the steel thicknesses are within allowable tolerances of the nominal or minimum thickness or gauge specified.
- C. Qualification Data for Installer. Refer to Quality Assurance Article below.
- D. Certification of work progress inspection. Refer to Quality Assurance Article below.

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### E. Certifications:

1. Submit roof manufacturer's certification that metal fasteners furnished are acceptable to roof manufacturer.

## 1.6 CONTRACT CLOSEOUT SUBMITTALS

- A. General: Comply with Requirements of Section 01 78 00 – Closeout Submittals.
- B. Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.
- C. Roofing Maintenance Instructions. Provide a manual of manufacturer's recommendations for maintenance of installed roofing systems.
- D. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

## 1.7 QUALITY ASSURANCE

- A. Engage an experienced roofing contractor specializing in sheet metal flashing work with a minimum of five (5) years experience.
- B. Maintain a full-time supervisor/foreman who is on the job-site at all times during installation. Foreman must have a minimum of five (5) years experience with the installation of similar system to that specified.
- C. Source Limitation: Obtain components from a single manufacturer. Secondary products which cannot be supplied by the specified manufacturer shall be approved in writing by the primary manufacturer prior to bidding.
- D. Upon request fabricator/installer shall submit work experience and evidence of financial responsibility. The Owner's representative reserves the right to inspect fabrication facilities in determining qualifications.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.
- B. Stack pre-formed and pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials which may cause discoloration or staining.

## 1.9 PROJECT CONDITIONS

- A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for pre-formed metal edge system.

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### 1.10 DESIGN AND PERFORMANCE CRITERIA

- A. Thermal expansion and contraction:
1. Completed metal edge flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.

### 1.11 WARRANTIES

- A. Owner shall receive a warranty from manufacturer of roofing materials covering all of the following criteria.
1. Pre-finished metal material shall require a written 20-year non-prorated warranty covering fade, chalking and film integrity. The material shall not show a color change greater than 5 NBS color units per ASTM D-2244 or chalking excess of 8 units per ASTM D-659. If either occurs material shall be replaced per warranty, at no cost to the Owner.
  2. Changes: Changes or alterations in the edge metal system without prior written consent from the manufacturer shall render the system unacceptable for warranty(ies).
  3. Warranty shall commence on date of substantial completion or final payment, whichever is agreed by contract.
  4. The Contractor shall provide the Owner with a notarized written warranty assuring that all sheet metal work including caulking and fasteners to be watertight and secure for a period of five years from the date of final acceptance of the building. Warranty shall include all materials and workmanship required to repair any leaks that develop, and make good any damage to other work or equipment caused by such leaks or the repairs thereof.
  5. Installing roofing contractor shall be responsible for the installation of the edge metal system in general accordance with the membrane manufacturer's recommendations.
  6. Installing contractor shall certify that the edge metal system has been installed per the manufacturer's printed details and specifications.
  7. One manufacturer shall provide a single warranty for all accessory metal for flashings, metal edges and copings, along with the warranty for metal roof areas.

## PART 2 PRODUCTS

### 2.1 PRODUCTS, GENERAL

- A. Refer to Division 01 Section "Common Product Requirements."
- B. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1. (Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.)

## SECTION 07620 -SHEET METAL FLASHING AND TRIM

- C. Substitutions: Products proposed as equal to the products specified in this Section shall be submitted in accordance with Specification Section 01300-Submittals.
1. Proposals shall be accompanied by a copy of the manufacturer's standard specification section. That specification section shall be signed and sealed by a professional engineer licensed in the state in which the installation is to take place. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.
  2. Include a list of three (3) projects of similar type and extent, located within a one hundred mile radius from the location of the project. In addition, the three projects must be at least five (5) years old and be available for inspection by the Architect, Owner or Owner's Representative.
  3. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.
  4. The Owner's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

### 2.2 ACCEPTABLE MANUFACTURERS

- A. The design is based upon sheet metal flashing and trim systems engineered and manufactured by one of the following or approved equal:
1. Garland Co., Inc. (The)
  2. Tremco
  3. Approved equal

### 2.3 MATERIALS

- A. General: Product designations for the materials used in this section shall be based on performance characteristics of the R-MER Edge System manufactured by the Garland Company, and shall form the basis of the contract documents.
- B. Materials:
1. Flash-less Snap-on Fascia Cover and Splice Plate: (R-Mer Force)
    - a. Exposed base metal material: Aluminum, ASTM B209, alloy 3105-H14, in thickness of .050" nom.
  2. Flash-less Snap-on Fascia Extruded Base Anchor
    - a. Base Anchor and Anchor Splice Plates: 6005A-T61 extruded aluminum
    - b. Compression Seal for top of anchor: TPE thermoplastic elastomer.
    - c. Sealant for Flange: Green-Lock Sealant XL: Single-component high performance 100% solids, interior and exterior polyether joint sealant

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- 3. Coping Cap Cover and Splice Plate (R-Mer Edge Coping)
  - a. Aluminum, ASTM B209, alloy 3105-H14, in thickness of .050" nominal
- 4. Coping Chairs:
  - a. Zinc-coated steel, ASTM A653, coating designation G-90, in thickness of 0.0635 nom. / 16 gauge; 36" to 48" by coil length, chemically treated, commercial or lock-forming quality.
- 3. Minimum gauge of aluminum to be specified in accordance with Architectural Sheet Metal Manual, Sheet Metal and Air Conditioning Contractor's National Association, Inc. recommendations.

C. Finishes:

- 1. Exposed surfaces for coated panels:
  - a. Steel Finishes: fluorocarbon finish. Epoxy primer baked both sides, .2-.25 mils thickness as approved by finish coat manufacturer. Weathering finish as referred by National Coil Coaters Association (NCCA).

Property	Test Method	Fluorocarbon*	
Pencil Hardness	ASTM D-3363 NCAA II-2	HB-H	
Bend	ASTM D-4145	O-T	NCAA II-19
Cross-Hatch Adhesion	ASTM D-3359	no loss of adhesion	
Gloss (60° angle)	ASTM D-523	25+/-5%	
Reverse Impact	ASTM D-2794	no cracking or loss of adhesion	
Nominal Thickness	ASTM D-1005		
primer	0.2 mils		
topcoat	0.7 mils min		

\*Subject to minimum quantity requirements

- b. Color shall be selected by the Owner. Include cost to custom color match other adjacent finished metal products and/or Owner's color sample.

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2. Exposed and unexposed surfaces for mill finish flashing, fascia, and coping cap, shall be as shipped from the mill.

### 2.4 RELATED MATERIALS AND ACCESSORIES

- A. Metal Primer: Zinc chromate type.
- B. Plastic Cement: ASTM D 4586
- C. Sealant: Specified in Section 07900 or on drawings.
- D. Underlayment: 45 mil high temperature underlayment, as recommended by manufacturer.
- E. Downspout material (4" x 4" x 1/8") thick aluminum, weld and grind smooth required offsets and post paint with baked on Kynar .
- F. Fasteners:
  1. Corrosion resistant screw fastener as recommended by metal manufacturer. Finish exposed fasteners same as flashing metal.
  2. Fastening shall conform to Factory Mutual 1-90 requirements or as stated on section details, whichever is more stringent.
- G. Downspout Anchorage Devices: See drawings for location of attachment (minimum of 2 per downspouts) and material type.
- H. Scupper boxes are to be welded, ground smooth and post painted.

## PART 3 - EXECUTION

### 3.1 EXECUTION, GENERAL

- A. Refer to Division 07 Section Common Work Results for Thermal and Moisture Protection.

### 3.2 PROTECTION

- A. Isolate metal products from dissimilar metals, masonry or concrete with bituminous paint, tape, or slip sheet. Use gasketed fasteners where required to prevent corrosive reactions.

### 3.3 GENERAL

- A. Secure fascia to wood nailers at the bottom edge with a continuous cleat.
- B. Fastening of metal to walls and wood blocking shall comply with SMACNA Architectural Sheet Metal Manual, and manufacturer's recommendations whichever is the most stringent standard.

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- C. All accessories or other items essential to the completeness of sheet metal installation, whether specifically indicated or not, shall be provided and of the same material as item to which applied.
- D. Allow sufficient clearances for expansion and contraction of linear metal components.
- E. Secure metal using fasteners as required by the system. Exposed face fastening will be rejected.

### 3.4 INSPECTION

- A. Verify that curbs are solidly set and nailing strips located.
- B. Perform field measurements prior to fabrication.
- C. Coordinate work with work of other trades.
- D. Verify that substrate is dry, clean and free of foreign matter.
- E. Commencement of installation shall be considered acceptance of existing conditions.

### 3.5 MANUFACTURED SHEET METAL SYSTEMS

- A. Furnish and install manufactured fascia, fascia extender and coping cap systems in strict accordance with manufacturer's printed instructions.
- B. Provide factory-fabricated accessories including, but not limited to, fascia extenders, miters, scuppers, joint covers, etc. Refer to Source limitation provision in Part 1.

### 3.6 SHOP-FABRICATED SHEET METAL (ACCESSORY TRIM & SCUPPER BOX)

- A. Metal work shall be shop fabricated to configurations and forms in accordance with recognized sheet metal practices. Fabricate scuppers as shown of drawing
- B. Hem exposed edges.
- C. Angle bottom edges of exposed vertical surfaces to form drip.
- D. Lap corners with adjoining pieces fastened and set in sealant.
- E. Install sheet metal to comply with refernced SMACNA and NRCA standards.

### 3.7 FLASHING MEMBRANE INSTALLATION

- A. Flashless Snap On Facia Detail



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1. Position roofing membrane over the roof edge covering nailers completely, fastening eight (8) inches on center. Install membrane with proper material and procedure according to manufacturers's recommendations.
2. Prior to installing the base anchor, assure a level plane is present. If not, shim the roof edge surface as required.
3. Extruded base anchor: Apply two ¼" beads of Green-Lock Sealant XL or equal on the bottom surface of the top flange of the extruded anchor.
4. Set the extruded anchor on the edge and face fasten through pre-punched slots every 18 inches o.c. for 5.75 inch face fascia, and 18 inches o.c. staggered for any fascia size greater than 5.75 inches. Begin fastening 6 inches from ends.
5. Install Green-Lock Sealant XL or approved equal at the ends of the base frame to prevent water from running between base anchor joints.
6. Install compression seals every 40 inches on center in the slots located at the top of the extruded anchor.
7. Install fascia cover setting the top flange over the top flange and compression seals of the base anchor. Assure compression seals are in place during this process. Beginning on one end and working towards the opposite end, press downward firmly (do not rotate) until "snap" occurs and cover is engaged along entire length of miter.
8. Install splice plate at each end of the base anchor and fascia cover prior to the installation of the next adjacent ten foot piece.

### C. Coping Cap Detail

1. Install miters first.
2. Position roofing membrane over the wall edge covering nailers completely, fastening eight (8) inches on center. Install membrane with proper material and procedure according to manufacturers's recommendations.
3. Install minimum twelve (12) inch wide anchor chair at 30" on center.
4. Install 8" wide splice plate by centering over 12" wide anchor chair. Apply two beads of sealant to either side of the splice plate's center. Approximately 2" in from the coping cap joint. Install coping cap by hooking outside hem of coping on outside face of anchor chair. Press downward on inside edge of coping until "snap" occurs and hem is engaged on the entire chair.

### C. Slip Flashing Detail

1. Install new slip flashing under existing metal and terminate with fasteners 8" on center incorporating neoprene washers.
2. All slip flashing shall be fabricated to mirror the substrate to which they are attached and include a hemmed drip edge.

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### 3.8 CLEANING

- A. Clean installed work in accordance with the manufacturer's instructions.
- B. Replace damaged work than cannot be restored by normal cleaning methods.

### 3.9 CONSTRUCTION WASTE MANAGEMENT

- A. Remove and properly dispose of waste products generated. Comply with requirements of authorities having jurisdiction

### 3.10 FINAL INSPECTION

- A. At completion of installation and associated work, meet with Contractor, Architect, installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.
- B. Inspect work and flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- D. Notify the Architect upon completion of corrections.
- E. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.
- F. Immediately correct roof leakage during construction. If the Contractor does not respond within twenty four (24) hours, the Owner will exercise rights to correct the Work under the terms of the Conditions of the Contract.

### 3.11 DEMONSTRATION AND TRAINING

- A. At a time and date agreed to by the Owner, instruct the Owner's facility manager, or other representative designated by the Owner, on the following procedures:
  - 1. Troubleshooting procedures.
  - 2. Notification procedures for reporting leaks or other apparent roofing problems.
  - 3. Maintenance.
  - 4. The Owner's obligations for maintaining the warranty in effect and force.
  - 5. The Manufacturer's obligations for maintaining the warranty in effect and force.

END OF SECTION

## SECTION 07720 - ROOF ACCESSORIES

### 1.1 GENERAL

- A. Submittals: Per Conditions of Contract and Division 1.
- B. Product data for each type of product specified.
- C. Shop drawings showing fabrication and installation of each roof accessory specified.
- D. Samples representing color, texture, shape, and sizes of each roof accessory specified.

### 1.2 PRODUCTS

- A. Prefabricated Curbs and Equipment Supports: Comply with loading and strength requirements for units supporting other work. Coordinate with equipment to be supported.
  - 1. Fabricate of structural-quality, hot-dip galvanized or galvalume sheet steel, factory-primed and prepared for painting with welded or sealed mechanical corner joints.
  - 2. 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.
  - 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Curbs, Inc.
    - b. Custom Curb, Inc.
    - c. The Pate Co.
    - d. Roof Products and Systems Corp.
    - e. ThyCurb Div./ThyBar Corp.
    - f. Or approved equal.
- B. Galvanized Steel Sheet: ASTM A 526 G 90 (ASTM A 526M, Z 275), commercial quality, or ASTM A 527, G 90 (ASTM A 527M, Z 275), lock-forming quality, hot dipped galvanized, mill phosphatized where indicated for painting; not less than 0.0396 inch (1.0 mm) thick, unless otherwise indicated.
- C. 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 items indicated.
- D. Roof Hatches:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
    - a. Babcock-Davis Hatchways, Inc.
    - b. Bilco Company
    - c. Bristolite Skylights
    - d. Custom Curb, Inc.
    - e. Dur-Red Products, Inc.
    - f. Goeller Enterprises

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- g. Hi Pro International, Inc.
  - h. J. L. Industries, Inc.
  - i. Metallic Products Corporation
  - j. Milcor, Inc.
  - k. Nystrom Products Co.
  - m. Precision Stair Corporation
  - n. Roof Products & Systems Corp.
  - o. ThyCurb, Inc.
  - p. Trimco, Inc.
  - q. Wasco Products, Inc.
  - r. or approved equal
2. General: Frame with minimum 12-inch high, integral-curb, double-wall construction with 1-1/2 inch (38-mm) insulation, formed cants and cap flashing (roofing counterflashing), with welded or sealed mechanical corner joints. Provide double-wall cover (lid) construction with 1-inch-(25mm) thick insulation core. Provide gasketing and equip with corrosion-resistant or hot-dip galvanized hardware including pintle hinges, hold-open devices, interior padlock hasps, and both interior and exterior latch handles.
- a. Fabricate units to withstand 40-lbf/sq. ft. (1.9-kPa) external and 20-lbf/sq. ft. (0.95-kPa) internal loading pressure.
3. Single-Leaf Personnel Hatches:
- a. Size: As indicated 30 x 42 inches for ladder access.
  - b. Material: Manufacturer's standard
  - c. Baked-Enamel Finish: Manufacturer's standard two-coat thermocured system.
    - (i) Color and Gloss: As selected from manufacturer's full range.
4. Sloping Roofs: Where slope or roof deck exceeds 1/4 inch per foot (1:48), fabricate hatch curbs with height tapered to match slope to level tops of units.
- E. Roof Hatch Safety Railing System: Provide for all existing roof hatches. Provide size to fit on all hatches by Nesea Corp or approved equal.
- 1. Product Model#: RHSR-SS
  - 2. Product Description: Roof Hatch Safety Railing System for safe egress and ingress through roof type access hatches and for protection of roof opening while roof hatch is up. Meets OSHA Standard CFR 29 1910.23 and CFR 29 1910.27.
  - 3. Product Selection Criteria: For roof hatches such as 2'6" x 3" and with hatchway ladder mounted on 2'6" side of hatch opposite of hatch lid hinge.
  - 4. Type of Installation: Permanent bolt on installation of right and left handed railings, guard railings, mid railings and chain as per supplied instructions and hardware.
  - 5. Materials:
    - a. Flat bar: 2" x 3/8" thickness A36 mild steel.
    - b. Pipe: 1 1/4" ID A53 Grade B seamed steel.
    - c. Weld filler: Metal NR211 E70XX (AWS).
    - d. Finish: Galvanized (hot dipped).
    - e. Chain System: 3/16" proof coil ASTM specification, zinc plated with quick links and 2 1/2" zinc plated hoops on each end.

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- f. Pipe caps: weather and light resistant vinyl 1 1/2" deep and to fit snugly over pipe ends.
  - g. Bolts and washers: Hex head bolts 3/8" x 2 1/2" grade Z, zinc plated. Fender washers for inside of hatch curb and standard flat washers outside.
  - h. Railing clamps: Kee Klamp manufactured models 10-7 and 45-7 for 1 1/4" pipe.
6. Sealant for Brackets: Brackets shall be sealed per roof manufacturer's approved methods.
7. Labels: Safety no hoisting warning label, model and serial # label, manufacturer identification label, patent or patent pending label.
8. Warranty: 5 years manufacturer's parts only warranty.
9. Manufacturer: Nesea Corporation, Mt. Laurel, NJ (856) 235-3111, JL Industries Incorporated, Nystrom Co., Babcock-Davis or approved equal.
- F. Baked Enamel Finish: Thermosetting-modified acrylic enamel primer and topcoat system complying with AAMA 603.8, except with a minimum dry film thickness of 1.5 mils, medium gloss.
- 1. Color: Match Architect's samples.
  - 2. Color: As selected by Architect.
- G. Roof Access Ladder:
- 1. Ladders shall be detailed and submitted for approval prior to fabrication. Full dimensions, wall and floor attachments, materials, construction and finish must be shown and comply with all safety orders pertinent to the installation.
  - 2. Furnish and install ladder model code 502 TUBULAR RAIL LOW PARAPET ACCESS LADDER WITH ROOFOVER RAIL EXTENSIONS and model 532 CAGED TUBULAR RAIL LOW PARAPET ACCESS LADDER WITH ROOFOVER RAIL EXTENSIONS as manufactured by O'Keeffe's Inc., 325 Newhall St., San Francisco, CA 94124, (415) 822-4222 or approved equal, at locations shown on drawings.
  - 3. Rungs shall be no less than 1-1/4" in section and 18-3/8" long, formed from tubular aluminum extrusions, alloy 6063-T6 and shall be squared and deeply serrated on all sides. Rungs shall be able to withstand a 1,000 pound load without failure.
  - 4. Channel Side Rails, shall be no less than 3/8" wall thickness by 3" wide.
  - 5. Heavy Duty Tubular Side Rails, shall be assembled from two interlocking aluminum extrusions no less than 3/8" wall thickness by 3" wide. Construction shall be self-locking stainless steel fasteners, full penetration TIG welds and clean, smooth and burr-free surfaces.
  - 6. Walk-Through Rail and Roof Rail Extension, shall extend no less than 3'-6" above the landing and shall be fitted with deeply serrated, square, tubular grab rails.
  - 7. Finish shall be clear anodized aluminum.

## SECTION 07720 - ROOF ACCESSORIES

8. Installation shall be according to manufacturer's recommendations.
9. Guaranteed against defects in material and workmanship for five years.

### 1.3 EXECUTION

- A. Installation: Comply with manufacturer's instructions and recommendations. Coordinate with installation of roof deck and other substrates to receive accessory units. Coordinate with vapor barriers, roof insulation, roofing and flashing installation to ensure 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.
  1. Except as otherwise indicated, install roof accessory items according to construction details of NRCA "Roofing and Waterproofing Manual."
- B. Clean exposed metal and plastic surfaces according to manufacturer's instructions. Touch up damaged metal coatings.

END OF SECTION 07720

## SECTION 07842 - FIRE-RESISTIVE JOINT SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes fire-resistive joint systems for the following:
1. Floor-to-floor joints.
  2. Floor-to-wall joints.
  3. Head-of-wall joints.
  4. Wall-to-wall joints.
  5. Perimeter fire-resistive joint systems consisting of floor-to-wall joints between perimeter edge of fire-resistance-rated floor assemblies and exterior curtain walls.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide fire-resistive joint 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 in which fire-resistive joint systems are installed.
- B. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join, and with movement capabilities and L-ratings indicated as determined by UL 2079.
1. Load-bearing capabilities as determined by evaluation during the time of test.
- C. Perimeter Fire-Resistive Joint Systems: For joints between edges of fire-resistance-rated floor assemblies and exterior curtain walls, provide systems of type and with ratings indicated below and those indicated in the Fire-Resistive Joint System Schedule at the end of Part 3, as determined by NFPA 285 and UL 2079.
1. UL-Listed, Perimeter Fire-Containment Systems: Integrity ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.
  2. OPL-Listed, Perimeter Fire-Barrier Systems: F-ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.
- D. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

#### 1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: For each fire-resistive joint system.
- C. Qualification Data: For Installer.
- D. Field quality-control test reports.

## SECTION 07842 - FIRE-RESISTIVE JOINT SYSTEMS

- E. Evaluation Reports: Evidence of fire-resistive joint systems' compliance with ICBO ES AC30, from the ICBO Evaluation Service.
- F. Research/Evaluation Reports: For each type of fire-resistive joint system.

### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."
- B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.
- C. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
  - 1. Fire-resistance 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 fire-resistive joint systems acceptable to authorities having jurisdiction.
  - 2. Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:
    - a) Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
    - b) Fire-resistive joint systems correspond to those indicated by referencing system designations of the qualified testing and inspecting agency.
- D. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- E. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, fire-resistive joint systems that may be incorporated into the Work include, but are not limited to, those systems indicated in the Fire-Resistive Joint System Schedule at the end of Part 3.
- B. Products: Subject to compliance with requirements, provide one of the fire-resistive joint systems indicated for each application in the Fire-Resistive Joint System Schedule at the end of Part 3.



## SECTION 07842 - FIRE-RESISTIVE JOINT SYSTEMS

### 2.2 FIRE-RESISTIVE JOINT SYSTEMS

- A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.
- B. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.
- B. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.2 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect fire-resistive joint systems and prepare inspection reports.
- B. Testing Services: Inspecting of completed installations of fire-resistive joint systems shall take place in successive stages as installation of fire-resistive joint systems proceeds. Do not proceed with installation of joint systems for the next area until inspecting agency determines completed work shows compliance with requirements.
  - 1. Inspecting agency shall state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.
- C. Remove and replace fire-resistive joint systems where inspections indicate that they do not comply with specified requirements.
- D. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and fire-resistive joint systems comply with requirements.

### 3.3 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

- A. Designation System for Joints in or between Fire-Resistance-Rated Constructions: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHBN.
- B. Designation System for Joints at the Intersection of Fire-Resistance-Rated Floor or Floor/Ceiling Assembly and an Exterior Curtain-Wall Assembly: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHDG:

## SECTION 07842 - FIRE-RESISTIVE JOINT SYSTEMS

- C. Floor-to-Floor Fire-Resistive Joint Systems FRJS-<#>:
1. UL-Classified Systems: FF-D-1005
  2. Assembly Rating: 1 hour.
  3. Nominal Joint Width: As indicated.
  4. Movement Capabilities: Class III - 30 percent compression or extension.
  5. L-Rating at 400 deg F (204 deg C): Less than 3.0 cfm/lin. ft. (0.01524 cu. m/s x sq. m).
- D. Floor-to-Wall Fire-Resistive Joint Systems FRJS-<#>:
1. Available UL-Classified Systems: FW-D-1001.
  2. Assembly Rating: 1 hour.
  3. Nominal Joint Width: As indicated.
  4. Movement Capabilities: Class III - 30 percent compression or extension.
  5. L-Rating at 400 deg F (204 deg C): Less than 1 cfm/lin. ft.
- E. Head-of-Wall Fire-Resistive Joint Systems FRJS-<#>:
1. Available UL-Classified Systems: HW-D-0028, HW-D-0038, HW-D-0039.
  2. Assembly Rating: 1 hour and 2 hours.
  3. Nominal Joint Width: As indicated 3/4" ~ 1".
  4. Movement Capabilities: Class III - 33 and 18 percent compression or extension.
- F. Wall-to-Wall Fire-Resistive Joint Systems FRJS-<#>:
1. Available UL-Classified Systems: WW-D-1015.
  2. Assembly Rating: 1 hour and 2 hours.
  3. Nominal Joint Width: As indicated.
  4. Movement Capabilities: Class III - 12.5 percent compression or extension.
- G. Perimeter Fire-Resistive Joint Systems PFRJS-<#>:
1. Available UL-Classified Perimeter Fire-Containment Systems: CW-S-1001, CW-S-2001.
    - a) Integrity Rating: 1 hour.
    - b) Insulation Rating: 1 hour.
    - c) Linear Opening Width: As indicated.
    - d) Movement Capabilities: Class III compression or extension.

END OF SECTION 07842

## SECTION 07920 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:
  - 1. Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
  - 2. Interior joints in vertical surfaces and horizontal nontraffic surfaces.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

#### 1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Preconstruction field test reports.
- D. Compatibility and adhesion test reports.
- E. Product test reports.

#### 1.4 QUALITY ASSURANCE

- A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint-sealant manufacturers for testing according to manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
- B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates according to the method in ASTM C 1193 that is appropriate for the types of Project joints.

## SECTION 07920 - JOINT SEALANTS

- C. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
  - 1. 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.
  - 2. All test samples shall be approved and accepted by the Owner, Architect, Construction Manager and Manufacturer's field inspection personnel. Coordinate work and testing schedule with Manufacturer's field inspection personnel.

### 1.5 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Installers five (5) year workmanship warranty from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Twenty (20) years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles or approved equal.

### 2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Sealants: 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
  - 3. Sealant Primers for Porous Substrates: 775 g/L.

## SECTION 07920 - JOINT SEALANTS

- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

### 2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Single-Component **Neutral-Curing** Silicone Sealant for all exterior and interior joints application except as listed for other applications:
  - 1. Products:
    - a. Dow Corning Corporation; 790.
    - b. GE Silicones; SilPruf LM SCS2700.
    - c. Tremco; Spectrem 1 (Basic).
    - d. Or approved equal.
  - 2. Type and Grade: S (single component) and NS (nonsag).
  - 3. Class: 100/50.
  - 4. Use Related to Exposure: NT (nontraffic).
  - 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
  - 6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
  - 7. Paintable surface.
- F. Single-Component Neutral-Curing Silicone Sealant for structural glazing and aluminum framing:
  - 1. Products:
    - a. Dow Corning Corporation; 795.
    - b. GE Silicones; UltraGlaze SSG4000.
    - c. Polymeric Systems Inc.; PSI-631.
    - d. Schnee-Morehead, Inc.; SM5731 Poly-Glaze Plus.
    - e. Tremco; Proglaze SG.
    - f. Tremco; Tremsil 600.
    - g. Or approved equal.

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2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
6. Paintable surface.

G. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant for all interior wet areas including all ceramic tiles:

1. Products:
  - a. Pecora Corporation; 898.
  - b. Tremco; Tremsil 600 White.
  - c. Or approved equal.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

### 2.4 ACOUSTICAL JOINT SEALANTS – For all interior paintable gypsum / wood joints.

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant 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 E 90.

1. Products:
  - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
  - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
  - c. or approved equal.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission for concealed gypsum / wood joints.

1. Products:
  - a. Pecora Corporation; BA-98.
  - b. Tremco; Tremco Acoustical Sealant.
  - c. or approved equal.

### 2.5 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

## SECTION 07920 - JOINT SEALANTS

- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape 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.

### 2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.
    - a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
  - 2. Remove laitance and form-release agents from concrete.

## SECTION 07920 - JOINT SEALANTS

- a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  1. Do not leave gaps between ends of sealant backings.
  2. Do not stretch, twist, puncture, or tear sealant backings.
  3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
  4. Complete sealant all the way of the full joint length, everywhere.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  1. Place sealants so they directly contact and fully wet joint substrates.
  2. Completely fill recesses in each joint configuration.
  3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.



## SECTION 07920 - JOINT SEALANTS

1. Remove excess sealant from surfaces adjacent to joints.
  2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- G. Installation of Preformed Silicone-Sealant System: Comply with manufacturer's written instructions.
- H. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- I. Conditions that should be avoided when working with Silicone Building Sealant:
1. **DO NOT** "wet tool" with solvents or soaps as this can inhibit the surface of this sealant, the rest of the sealant bulk may cure normally but the surface will remain tacky and gummy indefinitely.
  2. **DO NOT** apply this sealant to a backer rod that is contaminated with solvent or primer.
  3. **DO NOT** apply this sealant to a surface that has been cleaned with a solvent or primer.
  4. **DO NOT** apply this sealant to EPOXY containing surfaces (unless they have been tested by The Americas Construction Test Lab) since they can inhibit the cure.
- J. Do not use silicone sealant for:
1. Below-grade applications.
  2. Surfaces to be immersed in water for prolonged time.
  3. Brass and copper surfaces.
  4. Materials bleeding oils, plasticizers, and solvents.
  5. Structural glazing and adhesive.
  6. Surfaces to be painted.
  7. Surfaces in direct contact with food.
  8. Medical and pharmaceutical applications.
- K. Do not apply in totally confined spaces without ventilation for curing.

END OF SECTION 07920



## SECTION 08100 – FRP FIBERGLASS DOORS

### 1.0 GENERAL DESCRIPTION

- A. **WORK INCLUDED:** The fiberglass doors and aluminum sub-frames required for this work are indicated on the drawings and include, but is not necessarily limited to:
  - 1. The installation of new opening systems that include aluminum sub-frames, fiberglass doors, fiberglass panels, door hardware and glass.
  - 2. Only wide stile fiberglass doors are to be used.

### 1.1 QUALITY ASSURANCE

- A. **MANUFACTURER'S CERTIFICATION:** Manufacturer is to have a minimum of 10 years experience in the production of pre-installed hardware and pre-assembled door systems, using the type of materials specified for this project.
- B. **DISSIMILAR METALS:** Wherever aluminum is in contact with steel, concrete or other materials potentially creative of electrolytic action, provide all required permanent isolation of the aluminum by back painting with first-quality bituminous paint.
- C. **INSTALLER'S QUALIFICATIONS:** For the installation of the entrance systems, 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. **WARRANTY:**
  - 1. System manufacturer will guarantee THE ENTIRE SYSTEM FOR A PERIOD OF 10 YEARS.
  - 2. The Fiberglass doors are guaranteed for 10 YEARS AGAINST CORE RELATED PRODUCT FAILURE.
  - 3. Warranties are to be in writing and MUST be submitted before final invoices for payment will be reviewed.

### 1.2 TESTING AND PERFORMANCE REQUIREMENTS

- A. Entrance systems to be supplied and installed that will comply with requirements for system performance characteristics as determined by the testing methods listed.
- B. Copies of recent test reports must accompany the Product Data Submittal package, the reports required for this project are as follows:
  - 1. Thermal Performance Test
  - 2. Structural Performance Test
  - 3. FRP Face Sheet Test
- C. Thermal Performance for complete Door and Frame Entry System:
  - 1. Thermal Transmission: U-value of not more than 0.28,BTU/HR-FT-F per AAMA 1503.1-1988.

SECTION 08100 – FRP FIBERGLASS DOORS

2. Air Infiltration: Not more than 0.26 CFM/FT, per ASTM E283-91.

D. FRP FACE SHEETS AND CORE PERFORMANCE:

1. Materials to be tested in accordance with (per ASTM E84) Ratings will be as follows: (per ASTM E84-79a)

	FLAME SPREAD	SMOKE DEVELOPED
<u>FRP EXTERIOR</u> (Class C)	145	345
<u>FRP INTERIOR</u> (Class A)	10	320
<u>POLYSTYRENE CORE</u>	15	125

2. IMPACT STRENGTH OF FRP Face Sheets-per ASTM D256-Izod Impact Strength, Maintains 95% of physical Flexural Strength after 30 months of outdoor exposure. 13.5
3. Barcol Meter Hardness test on FRP Face Sheets-not more than 50, per ASTM D2583.
4. COLOR RETENTION of FRP Face Sheets-Color will not change more than 5.0 DE units after exposure to 500,000 Langleys.

1.3 MANUFACTURERS

- A. ACCEPTABLE MANUFACTURERS: The products outlined in this specification are not the exclusive property of any one manufacturer. However, it should be noted that the manufacturers, listed in this specification, will have to make some modifications to their standard products, and, that new dies and designs may be required to adhere to the demands of this specification.

Products are to be from FRP Architectural Doors, Inc Series Heavy Wall FD55. Fire Rated FRP Doors Series FR45/60/90. Other acceptable manufactures provided they adhere to specification are Curries Assa/Abloy or approved equal. FRP doors must incorporate Kemlite RFP face sheet with extended U/V protection or approved equal.

1.4 SUBMITTALS

A. PRODUCT DATA:

1. Submit manufacturer's technical data for each type stile classification of door. Include all frame sections, elevations and details.
2. Include details of: Main frame corner joint construction on doors, stile and rail size, core material, vision lite moldings, louvers and factory finishing specifications.

## SECTION 08100 – FRP FIBERGLASS DOORS

3. Submit two samples of each door stile classification that shows rails, stiles, core, joint construction, edge trim and closer reinforcing.
  4. Submit manufacturer of FRP face sheets.
- B. TEST REPORTS: Two copies of current test reports are to be included with the submittals.
- C. SHOP DRAWINGS: Submit signed and sealed shop drawings and calculations by a NJ registered professional engineer for the fabrication and installation of the Doors and Frames, and associated components of the work. Include wall elevations and detail sections of every typical composite member. Show frame anchoring, frame repairs to existing frames, glazing details, interior and exterior wall repairs and any other component or accessory required to complete each door opening.

### 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. IDENTIFICATION: Each door and frame will be tagged with a mark or number which correlates with designation system used for shop drawings.
- B. PROTECTION: All materials will be protected during transit and storage from soiling and deterioration.

### 2.0 DOORS, FRAMES AND PANELS

#### 2.1 CLASSIFICATIONS OF DOOR SYSTEMS, FRAMES AND PANELS:

- A. Door systems for this project are based on the following stile classification. Pre-approved manufacturers who have a standard product offering in that classification are listed.
- B. Classifications are as follows:

FRP Architectural Doors, Inc Series Heavy Wall FD55. Fire Rated FRP Doors Series FR45/60/90. Other acceptable manufactures provided they adhere to specification are Vale V600, Curries Assa/Abloy or approved equal.

#### 2.2 MATERIALS

- A. ALUMINUM MEMBERS:
1. Doors, sub-frames, miscellaneous components and entrance systems accessories are to be **by the same manufacturer**.
  2. Provide alloy and temper as recommended for resistance to corrosion and color control. Aluminum member references are ASTM B 221 for extrusions and ASTM B 209 for sheets.

## SECTION 08100 – FRP FIBERGLASS DOORS

### 2.3 ALUMINUM FRAMES & CLADDING:

- A. Refer to Storefront Specification Section 08411 for door frame requirements including signed and sealed shop drawings and calculations.
  - 1. VERTICAL MEMBERS-All sub-frames will be full height of opening.
- B. ALUMINUM COLOR FINISH: As specified in Storefront Specification Section 08411.

### 2.4 FIBERGLASS (FRP) FACE SHEETS

- A. THICKNESS AND COLOR:
  - 1. FRP face sheets will be .120 minimum thickness with a pebble-like surface with aluminum or galvanized steel backing sheet to meet current IBC code requirements. Face sheets shall be manufactured by Kemlite with extended UV protection or approved equal.
  - 2. COLOR shall be selected from the full range of available manufacturer's options.

### 2.5 FIBERGLASS (FRP) PANELS

#### A. ALUMINUM EDGED FIBERGLASS (FRP) PANELS:

- 1. CONSTRUCTION: Panels will be constructed of two sheets of .120 fiberglass sheets bonded to 3/4" core material. Panel thickness will be 1-3/4". A 1-3/4" x 2" x 1/8" wall thickness aluminum frame surrounds the perimeter of the panel.

WOOD EDGED PANELS WILL NOT BE ACCEPTED.

- 2. CORE MATERIAL: Core Insulation will be high density expanded polystyrene. Core to have compressive strength ASTM D1621 - 25psi density with a nominal R-Value of 6.5. Core material must have a proven record for use in door fabrication without delaminating. Fill all openings, including frames.

POLYSTYRENE CORES ARE REQUIRED.

- 3. COLOR shall be selected from the full range of available manufacturer's options.
- 4. FIXED FRP PANEL: Panel will be two sheets of .120 fiberglass sheets bonded to 3/4" core material. Panel thickness shall be 1".

### 3.0 EXECUTION and INSTALLATION

- A. SIZES AND PROFILES: the sizes for door and frame units and profile requirements as listed or shown in these Specifications are approximate. All bidders are responsible for visiting job site and measuring each tag for bidding purposes.
- B. EXACT ORDER SIZES: ALL PROPER MEASURING AND ORDERING OF MATERIALS IS THE SOLE RESPONSIBILITY OF THE SUPPLIER/INSTALLER.

SECTION 08100 – FRP FIBERGLASS DOORS

- C. TOLERANCES between doors and frames are 1/8" around all sizes of single doors and 1/8" on hinge jambs and header with 3/16" in center of pairs, 1/4" at threshold.
- D. NOTIFY OWNER at least 48 hours before schedule date of installation for each opening and for each day of work.
- E. PROVIDE barrier protection and warning signs around each opening before starting to work. This protection is for the people who may be using the building while the work is in progress.
- F. COMPLY with all life safety code procedures that effect the use of the opening while work is being done. These procedures will be provided by an official of the building being worked on.
- G. SET NEW THRESHOLDS in a bed of cement and press to a level line. However, never let threshold be raised more than an extra 1/2" on any one side.
- H. PERIMETER CAULK new door frame on both sides of frame and with a matching color caulk to the finish of the frame.
- I. INSTALLERS ARE TO CLEAN up every day leaving area in a safe and usable condition.

END OF SECTION 08100





## SECTION 08105- STEEL FRAMES

### 1.1 GENERAL

- A. Submit Product Data for each type of frame specified.
- B. Quality Assurance: Comply with ANSI/SDI 100.
- C. Fire-Rated Door Assemblies: NFPA 80, identical to assemblies tested per ASTM E 152, and labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

### 1.2 PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
  - 1. Amweld Building Products, Inc.
  - 2. Benchmark Commercial Doors.
  - 3. Ceco Door Products.
  - 4. Copco Door Co.
  - 5. Curries Co.
  - 6. Deansteel Manufacturing Co.
  - 7. Fenestra Corp.
  - 8. Kewanee Corp.
  - 9. Mesker Door, Inc.
  - 10. Pioneer Industries.
  - 11. Republic Builders Products.
  - 12. Steelcraft.
  - 13. Or approved equal.
- B. Cold-Rolled Steel Sheets: ASTM A 366 (ASTM A 366M), commercial quality, or ASTM A 620 (ASTM A 620M), drawing quality.
- C. Galvanized Steel Sheets: ASTM A 526 (ASTM A 526M), commercial quality, or ASTM A 642 (ASTM A 642M), drawing quality, with A 60 or G 60 (Z 180 or ZF 180) coating designation, mill phosphatized.
- D. Frames: Provide frames for doors, sidelights, borrowed lights, and other openings that comply with ANSI/SDI 100; fabricate to be rigid, neat in appearance, and free from defects, warp, or buckle.
  - 1. For interior frames provide units with mitered or coped and continuously welded corners, formed from 16 gage thick cold-rolled steel.
  - 2. For exterior frames provide units with mitered or coped and continuously welded corners, formed from 16 gage thick galvanized steel sheet.
  - 3. Door Silencers: 3 on strike jambs of single-door frames and 2 on heads of double-door frames.
  - 4. Plaster Guards: Provide where mortar might obstruct hardware operation and to close off interior of openings.
  - 5. For new frame install in existing opening. Knock down frame is allowed to secure to existing opening.

## SECTION 08105- STEEL FRAMES

- E. Tolerances: Comply with SDI 117.
- F. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to SDI 107 and the hardware specification.
- G. Finishes, General: Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
  - 1. Apply primers to frames after fabrication.
- H. Galvanized Steel Sheet Finishes: Comply with SDI 112 and the following:
  - 1. Surface Preparation: Clean surfaces with nonpetroleum solvent so that surfaces are free of oil or other contaminants. After cleaning, apply a conversion coating of the type suited to the organic coating applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified to comply with ASTM A 780.
  - 2. Galvanizing Repair Paint: SSPC-Paint 20, high-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight.
  - 3. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply air-dried primer specified below immediately after cleaning and pretreatment.
    - a. Shop Primer: Zinc-dust, zinc-oxide primer paint complying with performance requirements of FS TT-P-641, Type II.
  - 4. Field Painted Finish: Immediately after cleaning and pretreating, apply 2-coat finish consisting of prime coat and finish coat. See Section 09900, "Painting."
    - a. Color and Gloss: Match Architect's sample.
- I. Steel Sheet Finishes: Comply with SSPC-PA 1, "Paint Application Specification No. 1."
  - 1. Surface Preparation: Solvent-clean surfaces according to SSPC-SP 1. Remove mill scale and rust to comply with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).
  - 2. Pretreatment: Immediately after surface preparation, apply a conversion coating suited to organic coating applied over it.
  - 3. Factory Priming for Field-Painted Finish: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.
    - a. Color and Gloss: Match Architect's sample.

### 1.3 EXECUTION

- A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

## SECTION 08105- STEEL FRAMES

- B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set.
  - 1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.
  - 2. Install at least 3 anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb.
  - 3. In-place gypsum board partitions, install knock-down, slip-on, drywall frames.
  - 4. Install fire-rated frames according to NFPA 80.
  - 5. Coordinate installation of all required wiring/conduit prior to frame installation.
- C. Door Installation: Fit new wood doors accurately in new hollow-metal frames, within clearances specified in ANSI/SDI 100, including new door in existing frame.
  - 1. Fire-Rated Doors: Install with clearances specified in NFPA 80.
- D. Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.
- E. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08105



## SECTION 08211 - FLUSH WOOD DOORS

### 1.1 GENERAL

- A. Submittals: In addition to product data, submit the following:
1. 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 veneer matching and factory finishing and other pertinent data. For factory-machined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light and louver openings.
  2. Samples of actual materials in small sections for each face material and finish.
- B. Quality Standard: Comply with the following standard:
1. NWWDA Quality Standard: I.S.1-A, "Architectural Wood Flush Doors," of the National Wood Window and Door Association.
  2. AWI Quality Standard: "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute.
- C. Fire-Rated Wood Doors: Provide wood doors labeled and listed by UL, Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction. Provide certification for fire rating required acceptable to authorized agencies having jurisdiction for oversize fire rated doors over 4'-0" wide
- D. Warranty
1. Provide manufacturer's warranty to the following term:
    - a. Interior Solid Core Doors: "Full Life of Original Installation" including rehang and refinish if door(s) do not comply with Warranty tolerance standards.

### 1.2 PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide doors by one of the following or approved equal:
1. Marshfield Door Systems, Inc., quality as defined in this section.
  2. Algoma Wood Doors Inc., quality as defined in this section.
  3. Eggers Wood Doors Inc., quality as defined in this section.
  4. Mohawk Wood Doors Inc., quality as defined in this section.
  5. V-T Industries Inc., quality as defined in this section.
  6. Buell Door Company, quality as defined in this section.
  7. Or approved equal.
- B. Interior Solid Core Doors for Transparent Finish: As follows:  
**NOTE: ALL WOOD VENEER MUST APPEAR UNIFORM AND LIGHT IN APPEARANCE**
1. Faces: Select White Birch, plain sliced.
  2. Grade: "A" Select White ONLY

SECTION 08211 - FLUSH WOOD DOORS

3. Construction: 5 plies.
  4. Core: Structural composite lumber (engineered composite core)
  5. Bonding: Stiles and rails bonded to core, then entire unit abrasive planed before veneering.
- C. Interior Fire-Rated Solid Core Doors: As follows:
1. Faces and Grade: Provide faces and grade to match non-fire-rated doors in same area of building, unless otherwise indicated.
  2. Edge Construction: Provide manufacturer's standard laminated-edge construction for improved screw-holding capability and split resistance.
  3. Pairs: Furnish formed-steel edges and astragals for pairs of fire-rated doors, unless otherwise indicated.
  4. Pairs: Provide fire-rated pairs with fire-retardant stiles that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.
- D. Pairs and Sets: Provide pair matching and set matching.
- E. Fabricate flush wood doors to comply with following requirements:
1. In sizes indicated for job-site fitting.
  2. Factory fit doors to comply with clearance requirements of referenced quality standard. Comply with requirements of NFPA 80 for fire-resistance-rated doors.
  3. Factory machine doors for hardware that is not surface applied.
    - a. Metal Removable Mullions: Pre-machine locks and formed-steel edges for hardware for pairs of doors requiring removable mullions. See the Hardware Schedule.
  4. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
    - a. Light Openings: Trim openings with moldings of material and profile indicated. \* To be selected from manufacturer's standard profiles and colors unless noted otherwise. At existing buildings, metal trim shall be required to match adjacent existing to remain.
    - b. Louvers: Factory install louvers in prepared openings.
  5. Provide metal flashing at top of out swinging units.
- F. Finish wood doors at factory as factory finished.
1. Transparent Finish: Comply with requirements indicated for grade, finish system, staining effect, and sheen.
    - a. Grade: Custom.
    - b. Finish: Manufacturer's standard finish with performance requirements comparable to either AWI System TR-2 catalyzed lacquer or AWI System TR-4 conversion varnish.
    - c. Staining: Match Architect's sample or existing buildings' wood doors.

## SECTION 08211 - FLUSH WOOD DOORS

- d. Effect: Filled finish.
  - e. Sheen: Semigloss.
- G. Provide soundproof seal as noted in the Hardware Schedule. Adjust Hardware and frame to align properly to have the best acoustical effect.

### 1.3 EXECUTION

#### A. Examination

1. Verify substrate-openings conditions.
2. Verify that opening sizes and tolerances are acceptable and ready to receive this work.
3. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

#### B. Installation

1. Install fire-rated and non-rated doors in accordance with NFPA 80, manufacturers' instructions and fire rated labeling requirements.
2. Trim non-rated door width by cutting equally on both jamb edges.
3. Trim door height by cutting bottom edges to a maximum 3/4 inch (19mm).
4. Trim fire door height at bottom edge only, in accordance with fire rating requirements.
5. Pilot drill screw and bolt holes using templates provided by hardware manufacturer. (Use threaded through bolts for half surface hinges.)
6. Coordinate installation of doors with installation of frames and hardware.
7. Coordinate installation of glass and glazing.
8. Install door louvers and light kits plumb and level.
9. Reseal or refinish any doors that required site alteration.

#### C. Warranty Tolerances

1. Conform to WDMA standards and testing methods for warp, cup, bow and telegraphing.

#### D. Adjusting

1. Adjust work under provisions Division 1.
2. Adjust doors for smooth and balanced door movement.

#### E. Door and Frame Components Schedules

1. Refer to door and frame schedule.

END OF SECTION 08211





## SECTION 08361 – SECTIONAL OVERHEAD DOORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes electrically operated sectional overhead doors.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide sectional overhead doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:
  - 1. Wind Loads: Uniform pressure (velocity pressure) of 30 lbf/sq. ft. (960 Pa), acting inward and outward.
  - 2. Air Infiltration: Maximum Rate: 0.08 cfm (0.038 L/s) at 15 mph (24 km/h).
  - 3. Impact Test for Flying Debris: Comply with ASTM E 1996, tested according to ASTM E 1886.
    - a. Level of Protection: Enhanced Protection.
    - b. Wind Zone One, 90 mph, pressure test to 3/4 and 1-1/2 x design pressure (positive and negative).
- B. Operation-Cycle Requirements: Provide sectional overhead door components and operators capable of operating for not less than 10,000 cycles.

#### 1.3 SUBMITTALS

- A. Product Data: For each type and size of sectional overhead door and accessory.
- B. Shop Drawings: For special components and installations not detailed in manufacturer's product data.
- C. Samples: For each exposed finish.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.

### 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 or approved equal:

## SECTION 08361 – SECTIONAL OVERHEAD DOORS

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
1. Steel Doors with Insulated, galvanized Steel Panels:
    - a. Amarr Garage Doors.
    - b. Arm-R-Lite.
    - c. Clopay Building Products Company; a Griffon Company.
    - d. Fimbel Door Corporation.
    - e. General American Door Company.
    - f. Haas Door; a Nofziger Company.
    - g. Martin Door Manufacturing.
    - h. Overhead Door Corp.
    - i. Raynor.
    - j. Wayne-Dalton Corp.
    - k. Windsor Door; a MAGNATRAX Corporation.

### 2.2 STEEL DOOR SECTIONS

- A. Construct door sections including face sheets and frames from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, G90 (Z275) coating designation.
1. Exterior-Section Face: Manufacturer's standard flat.
- B. Fabricate door panels from a single sheet to provide sections not more than 24 inches (600 mm) high and nominally 2 inches (51 mm) deep.
1. For Insulated Doors: Thermal-break construction.
- C. Enclose open sections with channel end stiles formed from not less than 0.064-inch- (1.6-mm-) thick galvanized steel sheet and weld end stiles to door section in place.
- D. Reinforce bottom section with a continuous channel or angle complying with bottom-section profile and allowing installation of astragal.
- E. Provide reinforcement for hardware attachment.
- F. Thermal Insulation: Insulate inner core of steel sections with door manufacturer's standard polystyrene or polyurethane insulation. Enclose insulation completely within steel sections that incorporate the following inside facing material, with no exposed insulation material evident:
1. Inside Facing Material: Zinc-coated (galvanized) steel sheet.
- G. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

## SECTION 08361 – SECTIONAL OVERHEAD DOORS

- H. Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Surface Preparation: Clean galvanized surfaces so surfaces are free of oil and other contaminants.
    - a. Pretreat zinc-coated steel, after cleaning, with a conversion coating.
  - 2. Apply manufacturer's standard primer and finish coats powder-coat finish to interior- and exterior-door faces after forming.
    - a. Color and Gloss: As selected by Owner from manufacturer's full range.

### 2.3 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Manufacturer's low profile, galvanized steel track system, sized for door size and weight, designed for lift type indicated and clearances shown, including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Weld or bolt to track supports.
  - 1. Provide tracks configured for the following lift types:
    - a. Low profile.
  - 2. Track Reinforcement and Supports: Galvanized steel supporting members to provide strength and rigidity during opening and closing of doors.
- B. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of overhead door.
  - 1. Provide continuous flexible seals at door jambs for a weathertight installation.

### 2.4 HARDWARE

- A. General: Provide heavy-duty, corrosion-resistant hardware to suit door type.
- B. Hinges: Heavy-duty galvanized steel hinges at each end stile and at each intermediate stile. Attach hinges to door sections through stiles and rails.
- C. Rollers: Heavy-duty rollers with steel ball bearings in case-hardened steel races.
  - 1. Tire Material: Case-hardened steel.
- D. Push/Pull Handles: Galvanized steel lifting handles on each side of door.
- E. Slide Bolt: Engage through slots in tracks for locking by padlock, operable from inside only.

## SECTION 08361 – SECTIONAL OVERHEAD DOORS

- F. Locking device assembly with lock, dead bolt, operating handle, and adjustable locking bar to engage through slots in tracks.
  - 1. Locking Bars: Full-disc cremone type, both jamb sides operable from inside only.
- G. Chain Lock Keeper: Suitable for padlock.
- H. Refer to separate Hardware Specification for additional requirements.

### 2.5 COUNTERBALANCE MECHANISM

- A. Extension Spring: Oil-tempered wired springs with internal safety rods. Combine operation with a spring bumper in each horizontal track to cushion door at end of opening operation.
- B. Torsion Spring: Fabricated from oil-tempered-steel wire, mounted on a cross-header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables with cable safety factor of at least 5 to 1. Provide springs calibrated for a minimum of 10,000 cycles.
- C. Cable Drums: Cast-aluminum or gray-iron casting cable drums grooved to receive cable. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft.
- D. Cable Safety Device: Include a spring-loaded, steel or bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either cable breaks.
- E. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level shaft and prevent sag.
- F. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

### 2.6 ELECTRIC DOOR OPERATORS

- A. General: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycle requirements specified, and accessories required for proper operation.
- B. Disconnect Device: Hand-operated disconnect device for automatically engaging chain-and-sprocket operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount disconnect device and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- C. Provide control equipment, maximum 24-V, ac or dc.
- D. Door-Operator Type: Unit consisting of electric motor, trolley or drawbar type, and floor-level quick release for manual operation.

## SECTION 08361 – SECTIONAL OVERHEAD DOORS

- E. Electric Motors: High-starting torque, reversible, continuous duty, with overload protection, sized to start, accelerate, and operate door in either direction from any position.
  - 1. Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
- F. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled “Open”, “Close” and “Stop”. Sallyport doors remote-control in interlock mode. See Control Hardware for details.
- G. Obstruction Detection Device: Automatic safety sensor capable of protecting full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
- H. Limit Switches: Adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

### 2.7 GLAZING

- A. Glazing shall be 9/16" laminate impact resistant glass in manufacturer’s standard glazing trim to meet impact resistance glass requirements.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Install door, track, and operating equipment complete with necessary hardware according to Shop Drawings, manufacturer's written instructions, and as specified.

### 3.2 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup services.

### 3.3 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free of warp, twist, or distortion and with weathertight fit around entire perimeter.
- B. Touch-up Painting: Immediately after welding galvanized track to track supports, clean field welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

### 3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional overhead doors. Refer to Division 1 Section "Closeout Procedures"

END OF SECTION 08361



## SECTION 08710 – FINISH HARDWARE

### PART 1 - GENERAL

#### 1.01 SUMMARY

##### A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components
3. Field verification, preparation and modification of existing doors and frames to receive new door hardware.

##### B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

#### 1.02 REFERENCES

##### A. UL - Underwriters Laboratories

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

##### B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

##### C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

##### D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems

## SECTION 08710 – FINISH HARDWARE

4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

### 1.03 SUBMITTALS

#### A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
  - a. Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.
  - b. Review drawings and Sections from related trades to verify compatibility with specified hardware.
  - c. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

#### B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
  - a. Wiring Diagrams: For power, signal, and control wiring and including:
    - 1) Details of interface of electrified door hardware and building safety and security systems.
    - 2) Schematic diagram of systems that interface with electrified door hardware.
    - 3) Point-to-point wiring.
    - 4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
  - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule:
  - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
  - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.



## SECTION 08710 – FINISH HARDWARE

- c. Indicate complete designations of each item required for each opening, include:
  - 1) Door Index: door number, heading number, and Architect's hardware set number.
  - 2) Quantity, type, style, function, size, and finish of each hardware item.
  - 3) Name and manufacturer of each item.
  - 4) Fastenings and other pertinent information.
  - 5) Location of each hardware set cross-referenced to indications on Drawings.
  - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
  - 7) Mounting locations for hardware.
  - 8) Door and frame sizes and materials.
  - 9) Degree of door swing and handing.
  - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

### 5. Key Schedule:

- a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
- b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
- c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
- d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
- e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
- f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

### C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
  - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
  - b. Include warranties for specified door hardware.

### D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
  - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
  - b. Catalog pages for each product.
  - c. Final approved hardware schedule edited to reflect conditions as installed.
  - d. Final keying schedule

## SECTION 08710 – FINISH HARDWARE

- e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
- f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

### E. Inspection and Testing:

- 1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
  - a. fire door assemblies, in compliance with NFPA 80.
  - b. required egress door assemblies, in compliance with NFPA 101.

## 1.04 QUALITY ASSURANCE

### A. Qualifications and Responsibilities:

- 1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
- 2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
- 3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
  - a. For door hardware: DHI certified AHC or DHC.
  - b. Can provide installation and technical data to Architect and other related subcontractors.
  - c. Can inspect and verify components are in working order upon completion of installation.
  - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
- 4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

### B. Certifications:

- 1. Fire-Rated Door Openings:
  - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
  - b. Provide only items of door hardware that are listed products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations

## SECTION 08710 – FINISH HARDWARE

acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:
  - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
  - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
3. Electrified Door Hardware
  - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
4. Accessibility Requirements:
  - a. Comply with governing accessibility regulations cited in “REFERENCES” article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

### C. Pre-Installation Meetings

1. Keying Conference
  - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
    - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
    - 2) Preliminary key system schematic diagram.
    - 3) Requirements for key control system.
    - 4) Requirements for access control.
    - 5) Address for delivery of keys.
2. Pre-installation Conference
  - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - b. Inspect and discuss preparatory work performed by other trades.
  - c. Inspect and discuss electrical roughing-in for electrified door hardware.
  - d. Review sequence of operation for each type of electrified door hardware.
  - e. Review required testing, inspecting, and certifying procedures.
  - f. Review questions or concerns related to proper installation and adjustment of door hardware.
3. Electrified Hardware Coordination Conference:
  - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

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### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

### 1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- E. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation.

### 1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
  - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
  - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.

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- a. Mechanical Warranty
  - 1) Locks
    - a) Schlage L Series: 3 year
    - b) Schlage ND Series: 10 year
    - c) Or approved equal
  - 2) Exit Devices
    - a) Von Duprin: 3 year
    - b) Or approved equal
  - 3) Closers
    - a) LCN 4000 Series: 30 year
    - b) Or approved equal
- b. Electrical Warranty
  - 1) Locks
    - a) Schlage: 1 year
    - b) Or approved equal
  - 2) Exit Devices
    - a) Von Duprin: 1 year
    - b) Or approved equal

### 1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications.
- B. Approval of manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- C. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.
- D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

## SECTION 08710 – FINISH HARDWARE

### 2.02 MATERIALS

#### A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

### 2.03 HINGES

#### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Ives 5BB series or approved equal

#### B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
  - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
  - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
  - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:
  - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
9. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
  - a. Steel Hinges: Steel pins
  - b. Non-Ferrous Hinges: Stainless steel pins

## SECTION 08710 – FINISH HARDWARE

- c. Out-Swinging Exterior Doors: Non-removable pins
  - d. Out-Swinging Interior Lockable Doors: Non-removable pins
  - e. Interior Non-lockable Doors: Non-rising pins
10. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

### 2.04 CONTINUOUS HINGES

#### A. Manufacturers:

- 1. Scheduled Manufacturer:
  - a. Ives or approved equal

#### B. Requirements:

- 1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
- 2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
- 3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
- 4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
- 5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
- 6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
- 7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

### 2.05 ELECTRIC POWER TRANSFER

#### A. Manufacturers:

- 1. Scheduled Manufacturer and Product:
  - a. Von Duprin EPT-10 or approved equal

#### B. Requirements:

- 1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
- 2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

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### 2.06 MORTISE LOCKS

#### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage L9000 series or approved equal

#### B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to “KEYING” article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches. Provide motor based electrified locksets that comply with the following requirements:
  - a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
  - b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case
  - c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
  - d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate “hot levers” in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
  - e. Connections – provide quick-connect Molex system standard.
8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
  - a. Lever Design: 17A

### 2.07 CYLINDRICAL LOCKS – GRADE 1

#### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage ND series or approved equal



## SECTION 08710 – FINISH HARDWARE

### B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
  - a. Lever Design: Sparta

## 2.08 DEADBOLTS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage B600/B700/B800 Series or approved equal

### B. Requirements:

1. Provide grade 1 deadbolt series conforming to ANSI/BHMA A156.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide deadbolts with standard 2-3/4 inches (70 mm) backset. Provide 2-3/8 inches (60 mm) where noted or if door or frame detail requires. Provide deadbolt with full 1-inch (25 mm) throw, constructed of steel alloy.
4. Provide manufacturer’s standard strike.

## 2.09 EXIT DEVICES

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Von Duprin 98/35A series or approved equal
2. Acceptable Manufacturers and Products:
  - a. Detex Advantex series
  - b. Precision APEX 2000 series
  - c. Sargent 19-43-80 series
  - d. Falcon 25/24 series
  - e. Or approved equal

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### B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer’s approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

## 2.10 POWER SUPPLIES

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage/Von Duprin PS900 Series or approved equal

### B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:

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- a. 12/24 VDC Output, field selectable.
- b. Class 2 Rated power limited output.
- c. Universal 120-240 VAC input.
- d. Low voltage DC, regulated and filtered.
- e. Polarized connector for distribution boards.
- f. Fused primary input.
- g. AC input and DC output monitoring circuit w/LED indicators.
- h. Cover mounted AC Input indication.
- i. Tested and certified to meet UL294.
- j. NEMA 1 enclosure.
- k. Hinged cover w/lock down screws.
- l. High voltage protective cover.

### 2.11 CYLINDERS

#### 1. Manufacturers and Products:

- a. Scheduled Manufacturer and Product:
  - 1) Schlage Everest 29 R or approved equal

#### 2. Requirements:

- a. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
- b. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
  - 1) Conventional Patented Restricted Small Format: cylinder with small format interchangeable cores (SFIC) with restricted, patented keyway.
- c. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
- d. Nickel silver bottom pins.
- e. Replaceable Construction Cores.
  - 1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
    - a) 3 construction control keys
    - b) 12 construction change (day) keys.
  - 2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.

### 2.12 KEYING

#### A. Scheduled System:

##### 1. Existing factory registered system:

- a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

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### B. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
  - a. Master Keying system as directed by the Owner.
2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features:
  - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
  - b. Patent Protection: Keys and blanks protected by one or more utility patent(s).
4. Identification:
  - a. Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
  - b. Identification stamping provisions must be approved by the Architect and Owner.
  - c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
  - d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
  - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
5. Quantity: Furnish in the following quantities.
  - a. Change (Day) Keys: 3 per cylinder/core.
  - b. Permanent Control Keys: 3.
  - c. Master Keys: 6.

## 2.13 DOOR CLOSERS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. LCN 4010/4110/4020 series or approved equal

### B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.

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3. Cylinder Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

### 2.14 DOOR TRIM

#### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives or approved equal

#### B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

### 2.15 PROTECTION PLATES

#### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives or approved equal

#### B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

## SECTION 08710 – FINISH HARDWARE

### 2.16 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

#### A. Manufacturers:

1. Scheduled Manufacturers:
  - a. Glynn-Johnson or approved equal

#### B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

### 2.17 DOOR STOPS AND HOLDERS

#### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives or approved equal

#### B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

### 2.18 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

#### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Zero International or approved equal

#### B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

## SECTION 08710 – FINISH HARDWARE

### 2.19 SILENCERS

#### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives or approved equal

#### B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

### 2.20 DOOR POSITION SWITCHES

#### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Schlage or approved equal

#### B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

### 2.21 FINISHES

#### A. Finish: BHMA 626/652 (US26D); except:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

## SECTION 08710 – FINISH HARDWARE

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.
- C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- D. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.02 PREPARATION

- A. Where on-site modification of doors and frames is required:
  - 1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
  - 2. Field modify and prepare existing doors and frames for new hardware being installed.
  - 3. When modifications are exposed to view, use concealed fasteners, when possible.
  - 4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
    - a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
    - b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
    - c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

#### 3.03 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
  - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  - 2. Custom Steel Doors and Frames: HMMA 831.
  - 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
  - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20



## SECTION 08710 – FINISH HARDWARE

- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
  - 1. Install construction cores to secure building and areas during construction period.
  - 2. Replace construction cores with permanent cores as indicated in keying section.
  - 3. Furnish permanent cores to Owner for installation.
- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
  - 1. Conduit, junction boxes and wire pulls.
  - 2. Connections to and from power supplies to electrified hardware.
  - 3. Connections to fire/smoke alarm system and smoke evacuation system.
  - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
  - 5. Connections to panel interface modules, controllers, and gateways.
  - 6. Testing and labeling wires with Architect's opening number.
- K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- L. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- M. Closer/holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

## SECTION 08710 – FINISH HARDWARE

- O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- P. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.04 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

### 3.05 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

### 3.06 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

SECTION 08710 – FINISH HARDWARE

- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets: Please note that the Hardware Schedule has basis of design manufacturers listed. Approved equal manufacturers will be considered in accordance with Specification Section 01300 – Submittals.

Hardware Group No. 00

For use on Door #(s):

110A            110B            111A            111B            200A

Provide each RU door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
Y					
1	EA	ROLL UP DOOR HW	BY ROLL UP DOOR MANUFACTURER		
1		CARD READER	BY SECURITY INTEGRATOR		

Hardware Group No. 01

For use on Door #(s):

100

Provide each SGL door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
Y					
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	CLASSROOM LOCK	ND70BDC SPA	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	545A	A	ZER

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Hardware Group No. 01A

For use on Door #(s):

101

Provide each SGL door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
Y					
3	EA	HINGE	5BB1HW 4.5 X 4.5	630	IVE
1	EA	CLASSROOM LOCK	ND70BDC SPA	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	WALL STOP	WS406/407CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 02

For use on Door #(s):

102.1            103                    104.1                    105                    201                    202

Provide each SGL door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
Y					
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	CLASSROOM DEADBOLT	B663BDC	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302 10" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	545A	A	ZER

Hardware Group No. 02A

For use on Door #(s):

102.2            104.2

Provide each SGL door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
Y					
3	EA	HINGE	5BB1HW 4.5 X 4.5	630	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302 10" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4111 SHCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

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Hardware Group No. 03

For use on Door #(s):

106

Provide each SGL door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
Y					
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	545A	A	ZER

Hardware Group No. 04

For use on Door #(s):

107

Provide each SGL door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
Y					
1	EA	CONT. HINGE	224HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-L-NL-17 24 VDC	626	VON
1	EA	SFIC RIM CYLINDER	80-159	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	545A	A	ZER
1		CARD READER	BY SECURITY INTEGRATOR		
1	EA	DOOR CONTACT	679-05HM/WD AS REQUIRED	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS KL900 120/240 VAC	LGR	SCE

OPERATIONAL DESCRIPTION:

DOOR NORMALLY LOCKED AND LATCHED.

DOOR UNLOCKED BY VALID CARD READ OR KEY OVER RIDE.

FREE EGRESS AT ALL TIMES.

UPON LOSS OF POWER, DOOR REMAINS LOCKED AND LATCHED.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM.

SECTION 08710 – FINISH HARDWARE

Hardware Group No. 05

For use on Door #(s):

108                      109                      203

Provide each SGL door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
Y					
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	OFFICE/ENTRY LOCK	L9050BDC 17A 09-544 L283-722	626	SCH
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	545A	A	ZER

Hardware Group No. 06

For use on Door #(s):

110.1                      110.2                      111.1                      111.2                      200

Provide each SGL door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
Y					
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDEBBDC SPA BATTERY OPERATED "SUPPLIED BY SECURITY INTEGRATOR"	626	SCE
1	EA	SFIC EVEREST CORE	80-037 EV29 R	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	545A	A	ZER

OPERATIONAL DESCRIPTION:

\*LOCK TO BE SUPPLIED BY SECURITY INTEGRATOR\*

DOOR NORMALLY LOCKED AND LATCHED.  
 DOOR UNLOCKED BY VALID CARD READ OR KEY OVER RIDE.  
 FREE EGRESS AT ALL TIMES.  
 LOCK IS UNAFFECTED BY LOSS OF POWER.

END OF SECTION

## SECTION 08800 – GLAZING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
  - 1. Windows
  - 2. Doors.

#### 1.2 DEFINITIONS

- A. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- B. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- C. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
- D. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
  - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

## SECTION 08800 – GLAZING

- a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in 130 miles per hour at 33 feet (10 m) above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
    - 1) Seismic Loads: IBC 2018, NJ Edition.
    - 2) Design wind load velocity at the project site is 100 mph
    - 3) Importance factor is 1.15
    - 4) Exposure category is "C"
  - b. Specified Design Snow Loads: 30 PSF, but not less than snow loads applicable to Project as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7.0, "Snow Loads." Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
    - 1) Load Duration: 60 seconds or less.
  - c. Minimum Glass Thickness for Exterior Lites: Not less than 1/4".
  - d. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick of thickness indicated.
  2. For laminated-glass lites, properties are based on products of construction indicated.
  3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite 1/4", 6.0 mm thick and a nominal 1/2-inch-12.7-mm-) wide interspace.
  4. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
    - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).
    - b. Solar Heat Gain Coefficient: NFRC 200.
    - c. Solar Optical Properties: NFRC 300.

### 1.4 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.



## SECTION 08800 – GLAZING

- B. Samples: 12-inch- (300-mm-) square, for each type of glass product indicated, other than monolithic clear float glass.
- C. Glazing Schedule: Use same designations indicated on Drawings.
- D. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer.

### 1.5 QUALITY ASSURANCE

- A. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing according to ASTM C 1087, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:
- B. Glazing for Fire-Rated Door Window Assemblies: Glazing for assemblies that comply with NFPA 80 and 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 257 and 16 CFR 1201.
- C. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and IBC 2015 NJ Edition.
- D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: GANA Laminated Division's "Laminated Glass Design Guide" and GANA's "Glazing Manual."
  - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- E. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the Insulating Glass Certification Council.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockups as shown on Drawings for one bay or curtain wall or one unit window.
  - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### 1.6 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace

## SECTION 08800 – GLAZING

coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-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 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified or approved equal.

### 2.2 GLASS PRODUCTS

- A. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
  2. Provide FT (fully tempered) float glass.
- B. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:
1. Interlayer: Polyvinyl butyral of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
- C. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.

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1. Provide FT (fully tempered) float glass.
2. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
3. Sealing System: Dual seal.
4. Spacer Specifications: Manufacturer's standard spacer material and construction.
5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
  - a. Spacer Material: Aluminum with mill or clear anodic finish.
  - b. Corner Construction: Manufacturer's standard corner construction.

### 2.3 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
  1. Neoprene, ASTM C 864.
  2. EPDM, ASTM C 864.
  3. Silicone, ASTM C 1115.
  4. Thermoplastic polyolefin rubber, ASTM C 1115.
  5. Any material indicated above.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
  1. Neoprene.
  2. EPDM.
  3. Silicone.
  4. Thermoplastic polyolefin rubber.
  5. Any material indicated above.

### 2.4 GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
  1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

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- B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

- 1. Single-Component Neutral-Curing Silicone Glazing Sealants:

- a. Products:

- 1) See Section 07920 - Joint Sealants.
- 2) Type and Grade: S (single component) and NS (nonsag).
- 3) Class: 100/50.
- 4) Use Related to Exposure: NT (nontraffic).
- 5) Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.

### 2.5 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; non-staining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

- 1. AAMA 804.3 tape, where indicated.

- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

- 1. Type 1, for glazing applications in which tape acts as the primary sealant.
- 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

### 2.6 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

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- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

### 2.7 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

### 2.8 LAMINATED GLASS UNITS

- A. Laminated Glass:
  - 1. Products:
    - a. PPG Industries
    - b. Interpane Glass Company
    - c. Guardian Industries Corp.
    - d. Or approved equal
  - 2. Class 1 (clear) 5/16" laminated glass with laminate film sandwiched between two panes of glass.
    - a. 1/8" clear tempered glass lite - .060 PVB - 1/8" clear tempered glass lite

### 2.9 INSULATING GLASS UNITS (STANDARD UNITS)

- A. Passive Solar Low-E Insulating-Glass Units IG-1 (Standard Units):
  - 1. Products:
    - a. PPG Industries
    - b. Interpane Glass Company
    - c. Guardian Industries Corp.
    - d. Or approved equal
  - 2. Overall Unit Thickness and Thickness of Each Lite: 1" overall thickness, 1/4" interior and 1/4" exterior glass lites, 1/2" air space with Argon Gas Infill.
  - 3. Interspace Content: Argon.
  - 4. Outdoor Lite: Class 2 (clear) 1/4" tempered float glass.
    - a. Kind FT (fully tempered)
  - 5. Indoor Lite: Class 1 (clear) 1/4" tempered float glass.
    - a. Kind FT (fully tempered).

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- b. Solarban 60 Low-E coating #3 surface.
- 6. Low-E Coating: Pyrolytic or Sputtered on 3<sup>rd</sup> surface.
- 7. Visible Light Transmittance: 32 percent minimum.
- 8. Winter Nighttime U-Factor: 0.28 maximum.
- 9. Summer Daytime U-Factor: 0.26 maximum.
- 10. Solar Heat Gain: Coefficient: 0.19.
- 11. Outdoor Visible Reflectance: 6 percent maximum.
- 12. Shading Coefficient: 0.22

### PART 3 - EXECUTION

#### 3.1 GLAZING

- A. General: Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
  - 1. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
  - 2. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
  - 3. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
  - 4. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
  - 5. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
  - 6. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
  - 7. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- B. Tape Glazing: Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
  - 1. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
  - 2. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

## SECTION 08800 – GLAZING

3. Apply heel bead of elastomeric sealant.
  4. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
  5. Apply cap bead of elastomeric sealant over exposed edge of tape.
- C. Gasket Glazing (Dry): Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
1. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
  2. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
  3. Install gaskets so they protrude past face of glazing stops.
- D. Sealant Glazing (Wet): Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
1. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
  2. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

### 3.2 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
- B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 08800





## SECTION 09255 - GYPSUM BOARD ASSEMBLIES

### 1.1 GENERAL

- A. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
- B. Fire Resistance: Where fire resistance rated gypsum board assemblies are indicated, provide gypsum board assemblies that are identical to assemblies tested for fire resistant according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

### 1.2 PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
  - 1. Steel Framing and Furring:
    - a. Clark Steel Framing, Inc.
    - b. Consolidated Systems, Inc.
    - c. Dale Industries, Inc.
    - d. Dietrich Industries, Inc.
    - e. Marino/Ware (formerly Marino Industries Corp.).
    - f. National Gypsum Co.; Gold Bond Building Products Division.
    - g. Unimast, Inc.
    - h. Or approved equal.
  - 2. Grid Suspension Assemblies:
    - a. Armstrong World Industries, Inc.
    - b. Chicago Metallic Corp.
    - c. USG Interiors, Inc.
    - d. Worthington Steel Company (formerly National Rolling Mills).
    - e. Or approved equal.
  - 3. Gypsum Board and Related Products:
    - a. GP Gypsum, LLC
    - b. National Gypsum Co.; Gold Bond Building Products Division (NG).
    - c. United States Gypsum Co. (USG).
    - d. Or approval equal.
- B. Steel Framing Components for Suspended and Furred Ceilings: Provide components complying with ASTM C 754 for conditions indicated.
  - 1. Powder-Actuated Fasteners in Concrete: Corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190.
  - 2. Wire Ties: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper, 0.062 inch (1.6 mm) thick.

## SECTION 09255 - GYPSUM BOARD ASSEMBLIES

3. Wire Hangers: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper, 0.162-inch (4.1-mm) diameter.
  4. Hanger Rods: Mild steel and zinc coated or protected with rust-inhibitive paint.
  5. Flat Hangers: Mild steel and zinc coated or protected with rust-inhibitive paint.
  6. Channels: Cold-rolled steel, 16 ga minimum thickness of base metal and 7/16-inch- (11.1-mm-) wide flanges, and as follows:
    - a. Carrying Channels: 2 inches (50.8 mm) deep, 590 lb/1000 feet (88 kg/100 m), unless otherwise indicated.
    - b. Finish: ASTM A 653, G 60 (ASTM A 653M, Z 180) hot-dip galvanized coating for framing for exterior soffits and where indicated.
- C. Steel Studs for Furring Channels: ASTM C 645, in depth indicated and with 0.0179 inch (0.45 mm) minimum base metal thickness, unless otherwise indicated.
1. Protective Coating: ASTM A 653, G 40 (ASTM A 653M, Z 90) hot-dip galvanized coating for framing for exterior soffits and ceiling suspension members in areas within 10 feet (3 m) of exterior walls.
- D. Steel Resilient Furring Channels: Standard product fabricated from steel sheet complying with ASTM A 653 (ASTM A 653M) or ASTM A 568 (ASTM A 568M) to form ½-inch- (12.7-mm-) deep channel of the following configuration unless otherwise indicated:
1. Double-Leg Configuration: Hat-shaped channel with 1-1/2-inch- (38.1-mm-) wide face connected to flanges by double-slotted or expanded-metal legs (webs).
- E. Grid Suspension System for Interior Ceilings: ASTM C 645, manufacturer's standard direct-hung system.
- F. Steel Framing for Walls and Partitions: Provide a minimum of 20 gauge interior non-bearing steel framing members complying with the following requirements: (for all bearing walls refer to structural drawings)
1. Protective Coating: ASTM A 653, G 40 (ASTM A 653M, Z 90) hot-dip galvanized coating for framing members attached to and within 10 feet (3 m) of exterior walls.
  2. Steel Studs and Runners: ASTM C 645 in depth indicated 20 gauge minimum base metal thickness, unless otherwise indicated.

**INTERIOR NON-BEARING GYPSUM STUD PARTITION HEIGHT LIMITATION & GAUGE TABLE**

INTERIOR NON-BEARING GYPSUM STUD PARTITION			
1 5/8" STUD 16" O.C.	2 1/2" STUD 16" O.C.	3 5/8" STUD 16" O.C.	6" STUD 16" O.C.
X	18 GA. UP TO 12'-6"	18 GA. UP TO 16'-6"	16 GA. UP TO 22'-0"
20 GA. UP TO 8'-10"	20 GA. UP TO 11'-6"	20 GA. UP TO 15'-0"	X
SEE STRUCTURAL DRAWINGS FOR OTHER FRAMING GAUGE & SIZE			

- G. Steel Rigid Furring Channels: ASTM C 645, hat shaped, in depth indicated and with 20 gauge, minimum base metal thickness unless otherwise indicated.
- H. Fasteners for Metal Framing: Type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.
- I. Gypsum Board Products: Types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.
  - 1. Gypsum Wallboard: ASTM C 1396, C 1178, C 1658, in thickness indicated.
    - a. Type: Regular for vertical surfaces. (ToughRock® Mold-Guard™ by GP Gypsum or approved equal), unless otherwise indicated.
    - b. Type: Foil backed where indicated.
    - c. Type: Type X where required for fire-resistance-rated assemblies.
    - d. Type: For ceiling surfaces (ToughRock® Mold-Guard™ by GP Gypsum or approved equal), unless otherwise indicated.

## SECTION 09255 - GYPSUM BOARD ASSEMBLIES

- e. Type: Moisture and mold resistant gypsum panel for wet locations without tile surfaces (ToughRock® Mold-Guard™, DensArmor Plus® interior panel by GP Gypsum, Gold Bond Brand XP Gypsum Board by NG, Fiberock Aqua-Tough Interior panel by USG, or approved equal).
  - f. Type: Water and mold resistant with tile surfaces. (DensShield® Tile Backer by GP Gypsum or approved equal)
  - g. Type: Proprietary type as required for specific fire-resistance-rated assemblies.
  - h. Type: Impact/Abuse Resistant. (Gold Bond High Impact XP by NG or approved equal)
  - i. Type: Sound Resistant. (Gold Bond Soundbreak XP by NG or approved equal)
2. Proprietary Gypsum Board Products: Subject to compliance with requirements, provide one of the following products or approved equal where proprietary gypsum wall board is indicated:
- a. ToughRock® Fireguard® C, DensArmor Plus® Type C, by GP Gypsum or approved equal
  - b. Fire Shield G; National Gypsum Company; Gold Bond Building Products Division.
  - c. SHEETROCK Brand Gypsum Panels, FIRECODE C Core; United States Gypsum Company.
  - d. SHEETROCK Brand Gypsum Panels, ULTRACODE Core; United States Gypsum Company.
  - e. Or approved equal.
- J. Gypsum Board Base Layer(s) for Multilayer Applications: ASTM C 1396 in thickness indicated:
- 1. Type: Type X where indicated or required for fire-resistance-rated assemblies.
  - 2. Type: Sag-resistant type for ceiling surfaces, unless otherwise indicated.
- K. Accessories for Interior Installations: Cornerbead, edge trim, and control joints complying with ASTM C 1047, formed metal or plastic, with metal complying with the following requirement:
- 1. Steel sheet zinc added space coated by hot dip proceed or rolled zinc.
- L. Joint Treatment Materials: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
- 1. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.
    - a. Use pressure-sensitive or staple-attached, open-weave, glass-fiber reinforcing tape with compatible joint compound where recommended by manufacturer of gypsum board and joint treatment materials for application indicated.

## SECTION 09255 - GYPSUM BOARD ASSEMBLIES

2. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.
  - a. For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer.
  - b. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by gypsum board manufacturer.
  - c. For topping compound, use sandable formulation.
3. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.
  - a. Ready-Mixed Formulation: Factory-mixed product.
    1. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
    2. All-purpose compound formulated for both taping and topping compounds.
- M. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that is effective in reducing the airborne transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- N. Miscellaneous Materials: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.
  1. Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum panels.
  2. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.
  3. Fastening Adhesive for Metal: Special adhesive recommended for laminating gypsum panels to steel framing.
  4. Steel drill screws complying with ASTM C 1002 for the following applications:
    - a. Fastening gypsum board to steel members less than 0.033 inch (0.84 mm) thick.
    - b. Fastening gypsum board to gypsum board.
  5. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
  6. Foam Gaskets: Closed-cell vinyl foam adhesive-backed strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit metal stud size indicated.
  7. Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation to comply with ASTM C 665 for Type I.
  8. Polyethylene Vapor Retarder: ASTM D 4397, thickness and maximum permeance rating as follows:
    - a. 6 mils (0.15 mm), 0.13 perms (7.5 ng/Pa x s x sq. m).

## SECTION 09255 - GYPSUM BOARD ASSEMBLIES

9. Vapor Retarder Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

### 1.3 EXECUTION

- A. Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.
  1. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
  2. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.
    - a. Where building structure abuts ceiling perimeter or penetrates ceiling.
    - b. Where partition framing and wall furring abut structure, except at floor.
  3. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.
- B. Installing Steel Framing for Suspended and Furred Ceilings: as follows:
  1. Sway-brace suspended steel framing with hangers used for support.
  2. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.
  3. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- C. Installing Steel Framing for Walls and Partitions: Install steel studs and furring at spacings indicated.
  1. Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.
  2. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
  3. Cut studs 1 inch short of full height to provide perimeter relief.
  4. For STC-rated and fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.
  5. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated.
  6. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

## SECTION 09255 - GYPSUM BOARD ASSEMBLIES

7. Install polyethylene vapor retarder where indicated to comply with the following requirements:
  - a. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with mechanical fasteners or adhesives. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose mineral-fiber insulation.
  - b. Seal vertical joints in vapor retarders over framing by lapping not less than 2 wall studs. Fasten vapor retarders to framing at top, end, and bottom edges, at perimeter of wall openings, and at lap joints; space fasteners 16 inches (400 mm) o.c.
  - c. Seal joints in vapor retarders caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor retarder tape.
  - d. Repair any tears or punctures in vapor retarder immediately before concealing it with the installation of gypsum board or other construction.
  
- D. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.
  1. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
  2. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
  3. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches (813 mm) wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.
  4. Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.
  5. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
  6. Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.
  7. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.
    - a. Space screws a maximum of 12 inches (304.8 mm) o.c. for vertical applications or as required by fire resistive design.
  8. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.
  9. Install water-resistant gypsum backing board panels at sink and where indicated. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or penetrations.

## SECTION 09255 - GYPSUM BOARD ASSEMBLIES

10. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:
  - a. Fasten with screws.
11. Multilayer Fastening Methods: Apply base layers of gypsum panels and face layer to base layers as follows:
  - a. Fasten both base layers and face layers separately to supports with screws.
- E. Installing Trim Accessories: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.
  1. Install cornerbead at external corners.
  2. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.
    - a. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
    - b. Install L-bead where edge trim can only be installed after gypsum panels are installed.
    - c. Install U-bead where indicated.
    - d. Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by Architect for visual effect.
- F. Finishing Gypsum Board Assemblies: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.
  1. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.
  2. Apply joint tape over gypsum board joints, except those with trim accessories having flanges not requiring tape.
  3. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214-15.
    - a. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
    - b. Level 4 for gypsum board surfaces, for all exposed areas unless otherwise indicated.



## SECTION 09255 - GYPSUM BOARD ASSEMBLIES

4. Where Level 5 gypsum board finish is indicated, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories; and apply a thin, uniform skim coat of joint compound over entire surface. For skim coat, use joint compound specified for third coat, or a product specially formulated for this purpose and acceptable to gypsum board manufacturer. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects, tool marks, and ridges and ready for decoration.
5. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.
6. Finish water-resistant gypsum backing board to comply with ASTM C 840 and gypsum board manufacturer's directions.

END OF SECTION 09255



## SPECIFICATION 09670 - FLUID APPLIED FLOORING

### **PART 1 - GENERAL**

#### 1.01 SECTION INCLUDES

- A. Provide labor and materials for a seamless, polymer epoxy floor coating system, including surface preparation, primers and finish coats.

#### 1.02 ACCEPTABLE MANUFACTURERS AND INSTALLERS - Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or approved equal:

- A. Industrial Floor Corporation
- B. DUR-A-FLEX INC.
- C. General Polymers
- D. Selby
- E. Stonhard
- F. Manufacturer approved installer, who has technical qualifications, currently approved in writing and facilities to install specified systems.

#### 1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver material to a job site in clean, clearly labeled containers and inspect prior to start of job.
- B. Store material in a dry, enclosed area protected from the elements. Keep temperature of storage area between 60° and 90° F.

#### 1.04 SUBMITTALS

- A. System Data: Submit manufacturer's specifications on cured system and individual components of the Epoxy Flooring System, including physical properties and performance properties and tests described in Part 2.01 and submit Material Safety Data Sheets. Each individual component of the system will be evaluated on the basis of these standards. For any tests not listed in the manufacturer's standard nationally published data, the manufacturer must supply the missing data accompanied by the independent testing laboratory's test results which prove compliance in accordance with the referenced standard(s). Manufacturer's standard color chart shall also be submitted, and colors and computerized custom color matching shall be available upon request.
- B. The contractor shall submit a 6" x 6" cured system sample which the contractor has made for verification purposes and finish texture approval.
- C. Contractor Experience: The contractor shall furnish a list of projects using either specified material or equivalent that they have installed during the last five (5) years. Information shall include project name, square footage, owner contact name with Owner's address and phone number. Also, the contractor shall furnish resumes detailing the experience of key project personnel including supervisors and mechanics.

## SPECIFICATION 09670 - FLUID APPLIED FLOORING

### 1.05 ENVIRONMENTAL REQUIREMENTS

- A. Cure new concrete no less than 28 days under good conditions.
- B. Verify that substrate is properly equipped with vapor barriers and perimeter drains.
- C. Verify supply of adequate utilities, including electric, water, heat (between 60° and 90° F.) and lighting of no less than 80 ft candles measured at floor surface.
- D. Clear work area of other trades during, and for a period of 24 hours, after floor installation.
- E. Protect finished floor from damage by subsequent trades.

### 1.06 WARRANTY

- A. Submit a two (2) year warranty against defects in material and workmanship upon Substantial Completion of installation.

## PART 2 - PRODUCTS

### 2.01 PRODUCT DESCRIPTION

- A. A nominal 1/8-3/16" with Multiple Component, Seamless, Decorative, Moderate Duty, Slip Resistant **Quartz Epoxy** Floor System.
- B. Provide matching integral cove base at all walls, columns and other designated locations. Integral cove base shall be 4" high and 1/16" to 1/8" increasing in thickness downward to the 1" +/- radius cove.

### 2.02 PHYSICAL PROPERTIES

<b>Property</b>	<b>Test Method</b>	<b>Result</b>
Hardness (Shore D)	ASTM D-2240	70-80
Compressive Strength	ASTM D-695	16,000 psi
	ASTM C-579	10,500 psi
Tensile Strength	ASTM D-638	3,000 psi
	ASTM C-307	1,950 psi
Tensile Elongation	ASTM D-638	7.50%
Flexural Strength	ASTM D-790	4,000 psi
	ASTM C-580	2,900 psi
Flexural Modulus of Elasticity	ASTM D-790	5.5 x 10 <sup>5</sup>
Linear Shrinkage	ASTM D-2566	0.02%
Linear Expansion	ASTM D-696	2 x 10 <sup>-5</sup>
Bond Strength to Concrete	ASTM D-4541	400 psi substrate fails
Indentation	ML D-3134	.025 MAX
Impact Resistance	ML D-3134	Pass
Water Absorption	ASTM D-570	0.04%
Heat Resistance Limitation		140°F - 200°F
Flammability	ASTM D-570	Self Extinguishing
Flame Spread / NFPA 101	ASTM E-84	Class A
Abrasion Resistance	ASTM C-501	
CS17 Wheel 2000 GM Load 1000 Cycles		10 mg loss

## SPECIFICATION 09670 - FLUID APPLIED FLOORING

<b>Property</b>	<b>Test Method</b>	<b>Result</b>
Coefficient of Friction	ASTM D-2047	
Standard Slip-Resistant		N/A
Orange Peel		0.8
Smooth		0.7
VOC Content	Epoxy Resin Glaze	0g/1
	Polyurethane 2 HS	320.8 g/1

### 2.03 PRODUCT MIXING

- A. Mix on site with manufacturer supplied mix and measure apparatus to ensure a timely, accurate mix ratio and minimize waste.

## **PART 3 - EXECUTION**

### 3.01 PREPARATION

- A. Scarify, grind, clean and prepare the existing or new concrete floors to remove curing residue (if new), and all other foreign matter (if existing). This procedure will expose cleaned and conditioned surfaces to receive the new Epoxy quartz flooring materials.
- B. Verify that surface is dry and perfectly clean, free of all oil, grease, detergent, film, sealers and/or curing compounds.
- C. Create a surface profile with a steel shot blast machine and dust-free diamond grinders for edges. Verify acceptable condition of the substrate with the manufacturer prior to floor finish installation.

### 3.02 INSTALLATION

- A. Adhere strictly to manufacturer's current written instructions.
- B. Apply Primer if necessary, per manufacturer's recommendations.
- C. Apply a first coat of Epoxy Resin and broadcast decorative color quartz into wet coating per manufacturer's recommendations. Allow to cure.
- D. Sweep off excess decorative color quartz.
- E. Apply a second coat of Epoxy Resin and broadcast decorative color quartz into wet coating per manufacturer's recommendations. Allow to cure.
- F. Sweep off excess decorative color quartz.
- G. Apply a coat of Epoxy Sealer/Coating at 10-15 mils and allow to cure.
- H. Apply a topcoat of Polyurethane at 3-5 mils while applying a non-skid aggregate to achieve a slip-proof surface. Allow to cure.
- I. The total system thickness to be 1/4" nominal.

### 3.03 DETAILS

- A. Thoroughly route and vacuum moving cracks and joints, then fill with manufacturer's recommended joint/crack filler material.
- B. Pre-patch non-moving surface deviations with patching compound comprised of 100% solids epoxy and aggregate.
- C. "Key in" all drains, edges and transition points according to manufacturer's instructions.

## **END OF SECTION**



## SECTION 09900 – PAINTING

### 1.1 GENERAL

- A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.
1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. Block fill prime paint all CMU walls full height to the roof deck above ceiling and behind all built in casework, lockers, etc. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
1. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- D. Submittals: For each paint system specified, provide the following:
1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
  2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
- E. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated. After color selection, the Architect will furnish color chips for surfaces to be coated.
- F. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
  2. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.
  3. Submit Samples on the following substrates for the Architect's review of color and texture only:
    - a. Concrete: Provide two 4-inch- (100-mm-) square samples for each color and finish.
    - b. Concrete Masonry: Provide two 4-by-8-inch (100-by-200-mm) samples of masonry for each finish and color.
    - c. Stained or Natural Wood: Provide two 4-by-8-inch (100-by-200-mm)

## SECTION 09900 – PAINTING

- samples of natural- or stained-wood finish on actual wood surfaces.
- d. Ferrous Metal: Provide two 4-inch- (100-mm-) square samples of flat metal and two 8-inch- (200-mm-) long samples of solid metal for each color and finish.
- G. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.
  - H. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.
    - 1. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface as specified.
      - a. After finishes are accepted, the Architect will use the room or surface to evaluate coating systems of a similar nature.
  - I. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label.
  - J. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers in clean condition, free of foreign materials and residue. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.
  - K. Project Conditions: Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
  - L. Additional Material: Provide one gallon for each 200 gallons paint used in each color and type (minimum one gallon) to Owner.

### 1.2 PRODUCTS

- A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
  - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers.
- C. Colors: Match colors indicated by reference to manufacturer's color designations.



## SECTION 09900 – PAINTING

### 1.3 EXECUTION

- A. Examine substrates, areas, and conditions under which painting will be performed for compliance with paint application requirements. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates.
- C. Preparation: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- D. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- E. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.
  - 1. Cementitious Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
    - a. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
  - 2. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
    - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
    - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
    - c. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
  - 3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been

## SECTION 09900 – PAINTING

shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

- a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- F. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
  2. Use only thinners approved by paint manufacturer and only within recommended limits.
- G. Application: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors and finishes shall be selected during construction. Contractor shall allow for use of up to (4) four different wall colors and (2) two different trim colors throughout the building interior, including use of accent walls and use of different colors within the same room/space. Contractor shall allow for use of (2) two different exterior paint colors. Additionally, the contractor may have to color match and paint items to match immediately adjacent pre-finished items and existing items as necessary throughout construction.
  2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
  3. Provide finish coats that are compatible with primers used.
  4. The term "exposed surfaces" includes areas visible when permanent or built-in items are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
  5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  6. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  7. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
  8. Sand lightly between each succeeding enamel or varnish coat.
- H. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand

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- between applications.
2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
  3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- I. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
- J. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- K. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- L. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.
- M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.
- N. Field Quality Control: The Owner reserves the right to engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
1. The testing agency will perform appropriate tests as required by the Owner.
  2. If tests show material being used does not comply with specified requirements, the Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.
- O. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.
- P. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

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- Q. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.
- R. Paint Schedules: Provide the following paint systems for the various substrates indicated by Sherwin Williams (SW), PPG Paints or approved equal products:
- S. **Exterior Paint Systems:**
1. Ferrous Metal:
- a. Full gloss enamel finish - rust inhibitive primer with acrylic finish  
Primer: SW: ProIndustrial Pro-Cryl Primer  
PPG: Paints MultiPrime Low VOC Universal Primer 4360  
1st Coat: SW: DTM Acrylic Finish, semi-gloss  
PPG: Paints Pitt Tech Plus DTM Acrylic Semi-Gloss 4216  
2nd Coat: SW: DTM Acrylic Finish, semi-gloss  
PPG: Paints Pitt Tech Plus DTM Acrylic Semi-Gloss 4216
2. Non-Ferrous Metal:
- a. Full gloss enamel finish - galvanized metal primer with acrylic finish (Lintels, Railings, Bollards, etc.)  
Primer: SW: ProIndustrial Pro-Cryl Primer  
PPG: Paints Pitt Tech Plus DTM Acrylic Primer 4020  
1st Coat: SW: DTM Acrylic Finish, semi-gloss  
PPG: Paints Pitt Tech Plus DTM Acrylic Semi-Gloss 4216  
2nd Coat: SW: DTM Acrylic Finish, semi-gloss  
PPG: Paints Pitt Tech Plus DTM Acrylic Semi-Gloss 4216
- T. **Interior Paint Systems:**
1. Concrete, Masonry (not including CMU):
- a. Acrylic epoxy  
Primer: SW: Loxon Concrete Masonry Primer  
PPG: Paints Speedhide zero Interior Latex Primer 6-4900XI  
2nd Coat: SW: ProIndustrial Pre-Catalyzed Epoxy  
PPG: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx  
3rd Coat: SW: ProIndustrial Pre-Catalyzed Epoxy  
PPG: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx
2. Concrete Masonry Units (CMU): Typical Walls (Block fill prime paint all CMU walls full height and behind all built in casework, lockers, etc.)
- a. Acrylic epoxy – eggshell finish  
Filler: SW: Loxon Block Surfacer

SECTION 09900 – PAINTING

- 2<sup>nd</sup> coat: PPG: Paints Speedhide Latex Block Filler 6-15XI  
SW: ProIndustrial Pre-Catalyzed Epoxy, eggshell
- 3<sup>rd</sup> Coat: PPG: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-310  
SW: ProIndustrial Pre-Catalyzed Epoxy, eggshell  
PPG: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-310
- b. Acrylic epoxy – semi-gloss finish (Kitchen areas)
  - Filler: SW: Loxon Block Surfacer  
PPG: Paints Speedhide Latex Block Filler 6-15XI
  - 2<sup>nd</sup> coat: SW: ProIndustrial Pre-Catalyzed Epoxy, semi-gloss  
PPG: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-510
  - 3<sup>rd</sup> Coat: SW: ProIndustrial Pre-Catalyzed Epoxy, semi-gloss  
PPG: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-510
- 3. Drywall and Plaster:
  - a. Acrylic latex
    - Primer: SW: ProMar 200 zero VOC Primer  
PPG: Paints Speedhide zero Interior Latex Primer 6-4900XI
    - 2nd Coat: SW: ProIndustrial Pre-Catalyzed Epoxy  
PPG: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx
    - 3rd Coat: SW: ProIndustrial Pre-Catalyzed Epoxy  
PPG: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx
- 4. Wood:
  - a. Acrylic epoxy
    - Primer: SW: Multi-Purpose Primer  
PPG: Paints Seal Grip Interior Primer/Finish 17-951
    - 2nd Coat: SW: ProIndustrial Pre-Catalyzed Epoxy  
PPG: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx
    - 3rd Coat: SW: ProIndustrial Pre-Catalyzed Epoxy  
PPG: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx
  - b. Transparent Stain with urethane finish
    - 1st coat: SW: Minwax 250 Stain  
PPG: Deft Interior Low VOC Oil Stain DFT400
    - 2nd Coat: SW: Wood Classic Water Based Urethane  
PPG: Deft Waterbased Polyurethane DFT 15x
    - 3rd Coat: SW: Wood Classic Water Based Urethane  
PPG: Deft Waterbased Polyurethane DFT 15x
- 5. Ferrous Metal:
  - a. Gloss Finish - rust inhibitive primer with acrylic finish
    - Primer: SW: ProIndustrial Pro-Cryl Primer  
PPG: Paints Pitt Tech Plus DTM Acrylic Primer 4020
    - 1st Coat: SW: DTM Acrylic Finish, semi-gloss  
PPG: Paints Pitt Tech Plus DTM Acrylic Semi-Gloss 4216
    - 2nd Coat: SW: DTM Acrylic Finish, semi-gloss  
PPG: Paints Pitt Tech Plus DTM Acrylic Semi-Gloss 4216

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6. Non-Ferrous Metal (New Galvanized and Aluminum):
  - Primer: SW: ProIndustrial Pro-Cryl Primer  
PPG: Paints Pitt Tech Plus DTM Acrylic Primer 4020
  - 1st Coat: SW: DTM Acrylic Finish, semi-gloss  
PPG: Paints Pitt Tech Plus DTM Acrylic Semi-Gloss 4216
  - 2nd Coat: SW: DTM Acrylic Finish, semi-gloss  
PPG: Paints Pitt Tech Plus DTM Acrylic Semi-Gloss 4216
  
7. Concrete Floors – light traffic (janitor closets and utility spaces)
  - Primer: SW: ArmorSeal Tread Plex Primer  
PPG: Paints Breakthrough Satin Acrylic V51 Series
  - 2nd coat: SW: ArmorSeal Tread Plex Finish  
PPG: Paints Breakthrough Satin Acrylic V51 Series
  
8. Concrete Floors – Heavy Duty Vehicular Traffic Epoxy (Garages/Apparatus Bays)
  - Primer: SW: ArmorSeal 33 Epoxy Primer @ 8.0 mils dft  
PPG: TBD
  - 2nd coat: SW: ArmorSeal 1000 HS 2-Part Polyamide Epoxy  
@ 3.0-5.0 mils dft  
PPG: TBD
  - 3rd coat: SW: ArmorSeal 1000 HS 2-Part Polyamide Epoxy  
@ 3.0-5.0 mils dft  
PPG: TBD
  - Additive: Include manufacturer recommended anti-slip additive. Provide samples for selection by Owner, (3) minimum, fine, medium-fine and medium.
  
9. Exposed Ceiling Deck – dryfall coating
  - Primer – Ferrous Metal:
    - SW: ProIndustrial Pro-Cryl Primer
    - PPG: Paints MultiPrime Low VOC Universal Primer 4360
  - Primer – Non-Ferrous Metal:
    - SW: ProIndustrial Pro-Cryl Primer
    - PPG: Paints Pitt Tech Plus DTM Acrylic Primer 4020
  - Finish 1-2 coats:
    - SW: Waterborne Acrylic Dryfall
    - PPG: Paints Speedhide Super Tech Flat Dryfall 6-725XI

END OF SECTION 09900

## SECTION 10156 - TOILET COMPARTMENTS (Plastic)

### PART I SCOPE

- A. Requirements of the general conditions and special conditions apply to the work in this section.
- B. References
  - 1. ASTM International:
    - a. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
    - b. ASTM D 1735 - Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus
    - c. ASTM D 2247 - Standard Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity.
  - 2. United States Green Building Council (USGBC): LEED Green Building Rating System
- C. Work not included in this section:
  - 1. Toilet room accessories

### PART II SUBMITTALS

- A. Submit electronic shop drawings, including details and a sample of each item of hardware for Architect's approval.
- B. Provide drawings showing location for adequate steel reinforcements of wood blocking in walls to be provided by others for proper securement of the finished work.
- C. Provide the manufacturer's standard thirteen (13) color options and textures for Owner Selection that meet the NFPA 286 test.
- D. Furnish documentation on hardware, headrail, and continuous wall bracket to meet specification as outlined.
- E. Provide certified test results showing the High Density Polyethylene (HDPE) passes NFPA 286 test.

### PART III MATERIALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. ASI Global Partitions
  - 2. or approved equal
- B. Toilet compartment shall be floor mounted, overhead braced, with non-corrosive doors, panels, and pilasters.
- C. Panels, doors and pilasters shall be fabricated from High Density Polyethylene (HDPE) that is certified and passes the NFPA 286 test, containing a minimum of 10% postindustrial recycled material manufactured under high pressure forming a single component section which is

## SECTION 10156 - TOILET COMPARTMENTS (Plastic)

waterproof, nonabsorbent, and has a self-lubricating surface that resists marking with pens, pencils, or other writing utensils.

- D. Provide the manufacturer's standard thirteen (13) color options and textures for Owner Selection that meet the NFPA 286 test.
- E. Characteristics:
1. Dual component compression molded high density polyethylene (HDPE), virgin resin materials in colors that extend throughout the surface; the panels, doors and pilasters shall have combined recycled and/or virgin material (HDPE) as the core material.
  2. Doors, panels and pilasters shall be a minimum of 1" thick and all edges machined to a radius of .250" and all exposed surfaces to be free of saw marks.
- F. Fabrication:
1. Dividing panels shall be 55" high and mounted at 14" above finished floor.
  2. Doors shall be 55" and mounted 14" above finished floor.
  3. Pilasters shall be 82" high, mounted within a stainless steel shoe with one way theft proof, stainless steel sex bolts.
  4. Aluminum edging strips to be fastened to the bottom edge of all doors and panels using vandal proof stainless steel fasteners.
  5. Minimum clear height from finish floor to bottom of top rail shall be 80"
- G. Technical Data:
1. Solid Plastics Products to be independently certified in writing by the manufacturer indicating compliance to appropriate building codes governing the project as it applies to the use of plastic in a commercial building.
  2. The Product must comply with National Fire Protection Association (NFPA) 286 test.
- H. Manufacturer to supply a written warranty covering all components and hardware against breakage, corrosion, and delamination for a period of 15 years.

## PART IV HARDWARE

- A. Door hardware shall be as follows:
1. Hinges 8 inches long, fabricated from heavy-duty extruded aluminum with bright dip anodized finish, wrap-around flanges, adjustable on 30-degree increments, through bolted to doors and pilasters with stainless steel, sex bolts. Hinges operate on field-adjustable nylon cams, field adjustable in 30 degree increments.
  2. Each handicapped door to include (1) door pull and (1) wall stop.
  3. Door strike and keeper shall be fabricated from heavy aluminum extrusion (6364-T5 Alloy) with clear anodized finish with wraparound flange surface mounted and thru-bolted to door with one-way de-burred bolts. Size of strike shall be 6" in length.
  4. Door latch housing shall be fabricated from heavy aluminum extrusion (6364-T5 alloy) with clear anodized finish, surface mounted, and thru-bolted to door with one-way de-burred bolts. Slide to bolt and button shall be heavy aluminum with Tuff-Coat Black anodized finish.



SECTION 10156 - TOILET COMPARTMENTS (Plastic)

- B. Pilaster Sleeves shall be 3 inches high, stainless steel shoe secured to pilaster with stainless steel tamper resistant sex bolt.
- C. Provide full length double ear continuous extruded aluminum wall brackets. Brackets shall be used for all panels to pilaster, pilasters to wall, and panel to wall connections. Wall brackets shall be thru-bolted to panels and pilasters with one-way de-burred bolts. Attachment of brackets to adjacent wall construction shall be accomplished by 12" #14 stainless steel tamper proof head screws anchored directly behind the vertical edge of panels and pilasters at 13" intervals along with full length of bracket and each 13" interval alternately spaced between anchor connections.
- D. Headrail shall be heavy aluminum extrusion (6364-T5 Alloy) clear anodized finish in anti-grip configuration weighing not less than 1.188 lbs per linear foot. Headrail shall be fastened to tops of pilasters and headrail brackets by thru-bolting with one-way stainless steel de-burred bolts (no cadmium plated bolts allowed).
- E. Hinge hold-open setting shall be 30 degrees for all non-handicapped stall doors. Handicapped doors shall be self-closing.
- F. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
- G. Urinal screens shall be of a design with integrated leg to floor.

PART V INSTALLATION

Erection of partitions, etc. shall be in accordance with the manufacturer's standard recommendations and the following:

- A. All parts shall be erected in a substantial manner, straight, level and plumb.
- B. No evidence of drilling, cutting or patching shall be visible in the finished work.
- C. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 1/4".
- D. Finish surfaces shall be cleaned after installation and left free of imperfections.
- E. Authorized factory installers to be utilized.
- F. Adjust doors and latches to operate correctly.

END OF SECTION 10156



SECTION 10425 – SIGNS: CAST METAL PLAQUES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Cast Metal Plaque(s)

1.2 SHOP DRAWINGS

A. Submittals

1. Shop Drawings: Provide a shop drawing for the Cast Metal Plaque. Provide plans, elevations, and sections showing typical members, anchors, layout, reinforcement, accessories, and installation details. Provide the following:

- a) The Architect will provide a graphic layout of the text with the Owner's seal or logo.
- b) Provide a drawing to scale for Owner approval.
- c) Upon Owners approval of the text provide a full-size rubbing for metal plaques.

2. Samples: Provide a color selection material, pattern, and surface texture. **All samples go to the Construction Manager or the Owner.**

B. Unless indicated otherwise provide one (1) Cast Metal Plaque. Location of plaque to be determined by owner.

1.3 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 PRODUCTS

A. Fasteners: Concealed noncorrosive metal.

B. Anchors and Inserts: Nonferrous metal or hot-dipped galvanized. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts for concrete or masonry work.

C. Plaques: Castings shall be free from pits, scale, sand holes, or other defects. Comply with requirements shown for thickness, size, shape, and copy. Hand-tool and buff borders and raised copy to produce satin polished finish. Contents of plaques will be supplied by Owner / Architect and may include logos, County Seals, Building Seals, Mascots and Owner requested Graphics. Plaque size = 24" x 30"

1. Metal: Bronze
2. Border Style: Raised flat band.

SECTION 10425 – SIGNS: CAST METAL PLAQUES

- 3. Background Color and Texture: Provide Manufacturer's standard finishes for Owner's Selection.
- D. Metal Finishes: Comply with NAAMM "Metal Finishes Manual" for finish designations and applications recommendations.

PART 3 EXECUTION

- A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.
  - 1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
  - 2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
  - 3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.
  - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
  - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.
    - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place plaque in position and push until flush to surface, embedding studs in holes. Temporarily support plaque in position until adhesive fully sets.
    - b. Thin or Hollow Surfaces: Place plaque in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
- C. Remove and replace damaged or deformed plaques and plaques that do not comply with specified requirements. Replace plaques with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- D. Remove temporary protective coverings and strippable films.
- E. On completion of installation, clean exposed surfaces of plaques according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain plaques in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10425

## SECTION 10426 – INTERIOR ROOM SIGNS

### PART 1 GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Interior Room signage

#### 1.2 SHOP DRAWINGS

- A. Submittals
  - 1. Shop Drawings: Provide a shop drawing for the Interior Room Signs. Provide plans, elevations, and sections showing typical members, anchors, layout, reinforcement, accessories, and installation details. Provide the following:
    - a) A signage spread sheet with each door location, room name, room number and detailed layout.
    - b) Setting drawings, templates, and directions for installing anchors.
    - c) Full-size spacing templates for dimensional letters.
  - 2. Samples: Provide a separate physical sample of the color selection material, pattern, and surface texture for each of the signage types listed above in 1.1.A. **All samples go to the Construction Manager or the Owner.**
  - 3. Provide an additional ten (10) Interior Room Signs. The text and format will be provided by the Construction Manager or Owner.

#### 1.3 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five (5) years from date of Substantial Completion.

### PART 2 PRODUCTS

- A. Basis of Design: VISTA Sign Systems or approved equal
  - 1. Standard Room Sign: Curved Vista Wall Sign 7.87" x 4.1575" x 0.84" with 1mm Glossy/Non-Glare lens with standard ADA tactile and Braille and digitally printed 10 mil double-sided matte rigid PVC film insert
    - a) V200 (200mm/7.87") aluminum sign holder extrusion, Clear Anodized, 4.1575 inch.
    - b) CC200 - Clear cover (Glossy/Non-Glare) for V200 extrusion (1mm thick), Glossy/Non-glare, 4 inch.
    - c) 2 PEC200 - Plastic (ABS) end caps for V200 extrusion, Black.
    - d) CCADA200 - ADA Lens for V200 extrusion (7.8" / 198mm)

## SECTION 10426 – INTERIOR ROOM SIGNS

2. Standard Room Sign (Bathrooms, Elevators, Area of Refuge and Room Occupancy) 7.87" x 8" x 0.84" with 1mm Glossy/Non-Glare lens with standard ADA tactile and Braille and digitally printed 10 mil double-sided matte rigid PVC film insert
  - a) V200 (200mm/7.87") aluminum sign holder extrusion, Clear Anodized, 8 inch.
  - b) CC200 - Clear cover (Glossy/Non-Glare) for V200 extrusion (1mm thick), Glossy/Non-glare, 8 inch.
  - c) 2 PEC200 - Plastic (ABS) end caps for V200 extrusion, Black.
  - d) CCADA200 - ADA Lens for V200 extrusion (7.8" / 198mm)
- B. Fasteners: Concealed noncorrosive metal.
- C. Anchors and Inserts: Nonferrous metal or hot-dipped galvanized. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts for concrete or masonry work.
- D. Graphic Content and Style: Provide sign copy that complies with size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices. Also include braille lettering to meet the handicapped ADA requirements and 2018 IBC New Jersey Edition Code.

### PART 3 EXECUTION

- A. General: Install using mounting methods indicated and according to manufacturer's written instructions.
  1. Install level, plumb, true to line, and at locations and heights indicated, with surfaces free of distortion and other defects in appearance.
  2. Install signs so they do not protrude or obstruct according to the accessibility standard.
  3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
  4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Signage Used for Room Identification: Install in locations on walls as indicated and according to ADA accessibility standards.
- C. Mounting Methods:
  1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
    - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.

## SECTION 10426 – INTERIOR ROOM SIGNS

- b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
  - 2. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
  - 3. Brackets: Remove loose debris from substrate surface and install bracket supports in position so that sign is correctly located and aligned.
  - 4. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
  - 5. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
  - 6. Shim-Plate Mounting: Provide 1/8-inch- (3-mm-) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate.
- D. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
  - E. Remove temporary protective coverings and strippable films as signs are installed.
  - F. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner

END OF SECTION 10426





## SECTION 10429 – SIGNS: EXTERIOR DIMENSIONAL LETTERS

### Part 1 GENERAL

#### 1.1 SUMMARY

A. This Section includes the following:

1. Exterior dimensional letters.

#### 1.2 SUBMITTALS

A. Submittals

1. Shop Drawings: Provide a shop drawing for the Exterior dimensional letters. Provide plans, elevations, and sections showing typical members, anchors, layout, reinforcement, accessories, and installation details. Provide the following:
  - a) Provide a graphical layout based on the Contract Document Elevations.
  - b) Provide a drawing to scale for approval.
2. Samples: Provide a color selection material, pattern, and surface texture. **All samples go to the Construction Manager or the Owner.**

#### 1.3 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five (5) years from date of Substantial Completion.

### Part 2 PRODUCTS

#### 2.1 MATERIALS

- A. Aluminum Sheet: Alloy and temper recommended by manufacturer for use and finish indicated with not less than the strength and durability properties of ASTM B 209, alloy 5005-H15.
- B. Aluminum Extrusions: Alloy and temper recommended by manufacturer for use and finish indicated with not less than the strength and durability properties of ASTM B 221, alloy 6063-T5.
- C. Aluminum Castings: Alloy and temper recommended by manufacturer for casting process, use, and finish indicated.
- D. Fasteners: Use fasteners fabricated from metals that are not corrosive to sign material and mounting surface.

## SECTION 10429 – SIGNS: EXTERIOR DIMENSIONAL LETTERS

- E. Anchors and Inserts: Use nonferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

### 2.2 DIMENSIONAL LETTERS

- A. Cast Letters: Individual characters with smooth, flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, or other defects. Cast lugs into back of characters and tap to receive threaded mounting studs.

- 1. Metal: Aluminum

- B. Fabricated Letters: Metal, form exposed faces and sides of characters to produce surfaces free from warp and distortion. Include internal bracing for stability and attachment of mounting accessories.

- 1. Aluminum Sheet: Not less than 0.090 inch (2.3 mm) thick for front and not less than 0.063" for returns. Fabricate by heliarc welding process.
- 2. Letter Style: TBD Owner to select from manufacturer's full range of available standard typestyles, 5 minimum.

### 2.3 FINISHES

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other appearance characteristics, provide color matches as selected from manufacturer's full range, unless otherwise indicated.

- B. Aluminum:

- 1. Painted Finish: Modified-acrylic enamel system.
  - a. Custom color required. Match Owner's paint sample.

## Part 3 EXECUTION

### 3.1 INSTALLATION

- A. Install signs level, plumb, and at height indicated on the drawings, with sign surfaces free from distortion or other defects in appearance.

- B. Dimensional Letters: Mount letters and numbers using standard fastening methods recommended by manufacturer for letter form, type of mounting, wall construction, and condition of exposure indicated. Use heavy paper template to establish letter spacing and to locate holes for fasteners.

- 1. Projected Mounting: With letter backs separated from wall surface by one-half inch (1/2").

SECTION 10429 – SIGNS: EXTERIOR DIMENSIONAL LETTERS

- C. Remove and replace damaged or deformed letter that do not comply with specified requirements. Replace letters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- D. Remove temporary protective coverings and strippable films.
- E. On completion of installation, clean exposed surfaces according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10429



## SECTION 10430 – SIGNS: EXTERIOR ILLUMINATED DIMENSIONAL LETTERS

### Part 1 GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
1. Exterior Illuminated dimensional letters.

#### 1.2 SUBMITTALS

- A. Submittals
1. Shop Drawings: Provide a shop drawing for the Exterior Illuminated dimensional letters. Provide plans, elevations, and sections showing typical members, anchors, layout, reinforcement, accessories, and installation details. Provide the following:
    - a) Provide a graphical layout based on the Contract Document Elevations.
    - b) Provide a drawing to scale for approval.
  2. Samples: Provide a color selection material, pattern, and surface texture. **All samples go to the Construction Manager or the Owner.**

#### 1.3 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.

#### 1.4 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Five (5) years from date of Substantial Completion.

### Part 2 PRODUCTS

#### 2.1 MATERIALS

- A. Aluminum Sheet: Alloy and temper recommended by manufacturer for use and finish indicated with not less than the strength and durability properties of ASTM B 209, alloy 5005-H15.
- B. Aluminum Extrusions: Alloy and temper recommended by manufacturer for use and finish indicated with not less than the strength and durability properties of ASTM B 221, alloy 6063-T5.

## SECTION 10430 – SIGNS: EXTERIOR ILLUMINATED DIMENSIONAL LETTERS

- C. Aluminum Castings: Alloy and temper recommended by manufacturer for casting process, use, and finish indicated.
- D. Fasteners: Use fasteners fabricated from metals that are not corrosive to sign material and mounting surface.
- E. Anchors and Inserts: Use nonferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

### 2.2 DIMENSIONAL LETTERS

- A. Cast Letters: Individual characters with smooth, flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, or other defects. Cast lugs into back of characters and tap to receive threaded mounting studs.
  - 1. Metal: Aluminum
- B. Fabricated Letters: Metal, form exposed faces and sides of characters to produce surfaces free from warp and distortion. Include internal bracing for stability and attachment of mounting accessories.
  - 1. Aluminum Sheet: Not less than 0.090 inch (2.3 mm) thick for front and not less than 0.063" for returns. Fabricate by heliarc welding process.
  - 2. Letter Style: TBD Owner to select from manufacturer's full range of available standard typestyles, 5 minimum.
  - 3. Illuminated Units: Use manufacturer's standard lighting components including 13 MM neon tubing G.F.I. transformers, insulators, 277VAC U.L. recognized GTO cabling, electrobits, insulator boots and other components. Make provisions for servicing and concealed connection to building system. Coordinate electrical characteristics with those of power supply provided.
    - a. Backlighted Units: Use concealed white LED of indicated or required by size of characters. Include manufacturer's hardware for projection mounting of characters at distance from wall surface indicated.

### 2.3 FINISHES

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other appearance characteristics, provide color matches as selected from manufacturer's full range, unless otherwise indicated.
- B. Aluminum:
  - 1. Painted Finish: Modified-acrylic enamel system.
    - a. Custom color required. Match Owner's paint sample.

## SECTION 10430 – SIGNS: EXTERIOR ILLUMINATED DIMENSIONAL LETTERS

### Part 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install signs level, plumb, and at height indicated on the drawings, with sign surfaces free from distortion or other defects in appearance.
- B. Install interior electrical connections and drivers in concealed locations. Provide access panels as needed for maintenance. Where concealed installation is not practical, install all cabling and associated equipment within electrically rated raceways sized to accommodate all system equipment being provided. Maintain clean and neat appearance for raceway installation. Raceway to be factory finished in color to be selected by the Owner or painted to match adjacent wall color.
- C. Dimensional Letters: Mount letters and numbers using standard fastening methods recommended by manufacturer for letter form, type of mounting, wall construction, and condition of exposure indicated. Use heavy paper template to establish letter spacing and to locate holes for fasteners.
  - 1. Projected Mounting: With letter backs separated from wall surface by one-half inch (1/2").
- D. Remove and replace damaged or deformed letter that do not comply with specified requirements. Replace letters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- E. Remove temporary protective coverings and strippable films.
- F. On completion of installation, clean exposed surfaces according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10430





## SECTION 10522 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

### 1.1 GENERAL

- A. Submittals: Submit the following:
  - 1. Product Data: Include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, panel style, and materials.
  - 2. Samples for Initial Selection: Manufacturer's color charts showing full range of colors, textures, and patterns available for each finish indicated or exposed to view.
- B. Coordination: Verify that cabinets are sized to accommodate type and capacity of extinguishers indicated.
- C. UL-Listed Products: Fire extinguishers shall be UL listed with UL listing mark for type, rating, and classification of extinguisher.
- D. FM-Listed Products: Fire extinguishers approved by Factory Mutual Research Corporation for type, rating, and classification of extinguisher with FM marking.

### 1.2 PRODUCTS

- A. Fire Extinguishers: Provide fire extinguishers for each cabinet and for other locations indicated.
  - 1. Multipurpose Dry Chemical Type: Type MP-10, UL-rated 4-A:60-B:C, 10 lb nominal capacity, in enameled steel container.
  - 2. Class "K" high hazard area (kitchen and food classroom) dry chemical 4-A, 60:B:C, 10 lb. capacity in enameled steel container.
  - 3. Multipurpose Dry Chemical Type: UL-rated 2-A:10:B:C, 5 pound nominal capacity in steel container to hang on bracket in classroom or office.
- B. Cabinet Construction: Box with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
  - 1. Fire-Rated Cabinets: UL listed with UL listing mark with fire-resistance rating of wall where it is installed.
  - 2. Cabinet Type: Suitable for containing the following:
    - a. Fire extinguisher.
  - 3. Cabinet Mounting: Suitable for the mounting indicated:
    - a. Semirecessed: Partially recessed in walls of shallow depth.
  - 4. Trim Style: One piece with corners mitered, welded, and ground smooth.
    - a. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge.
      - 1) Rolled-edge with 2-1/2-inch backbend depth.
      - 2) Metal: Same metal and finish as door.

## SECTION 10522 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

- C. Door Material and Construction: Manufacturer's standard of material indicated, coordinated with cabinet types and trim styles selected.
  - 1. Enameled Steel: Hollow construction with tubular stiles and rails.
  - 2. Door Glazing: Fully tempered float glass complying with ASTM C 1048, Condition A, Type I, Quality q3, Kind FT, and Class as follows:
    - a. Class 1 (clear).
  - 3. Identify fire extinguisher in cabinet with FIRE EXTINGUISHER lettering applied to door. Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location.
    - a. Application Process: Silk screen.
- D. Door Style: Manufacturer's standard design.
  - 1. Full-Glass Panel: Fully tempered, Float glass, 1/8 inch thick.
- E. Door Hardware: Provide door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.
- F. Cabinet Finishes: Comply with NAAMM "Metal Finishes Manual." Protect exposed finishes from damage by application of temporary strippable covering prior to shipment.
- G. Steel Cabinet Finishes: Solvent-clean surfaces to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust from uncoated steel.
  - 1. Baked-Enamel Finish: Immediately after cleaning and pretreatment, apply a two-coat baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's instructions for application and baking to achieve a minimum dry film thickness of 2.0 mils.
    - a. Color and Gloss: In addition to manufacturer's standard "white", provide a minimum of 8 other painted finish options for review and selection by Owner. Paint the following:
      - 1) Exterior of cabinet except for surfaces indicated to receive another finish.
      - 2) Interior of cabinet.

### 1.3 EXECUTION

- A. Installation: Follow manufacturer's printed instructions.
- B. Install at heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities and meet State and handicapped codes and ADA requirements.
  - 1. Prepare wall recesses for cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.
  - 2. Fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb.

END OF SECTION 10522

## SECTION 10800 - TOILET AND BATH ACCESSORIES

### 1.1 GENERAL

- A. Submittals: Manufacturer's product data for each toilet accessory item specified, including details of construction relative to materials, dimensions, gages, profiles, mounting methods, specified options, and finishes.
- B. Samples: Full-size samples of the following toilet accessory items to verify design, operation, and finish requirements. Acceptable samples will be returned and may be used in the Work:
  - 1. Hand dryer.
  - 2. Stainless steel framed mirror unit.
  - 3. Toilet tissue dispenser.
  - 4. Soap Dispenser.
  - 5. Grab Bars.
  - 6. Waste Receptacle.
  - 7. Sanitary Napkin Disposal.
  - 8. Napkin/Tampon Vendor.
  - 9. Trash Container.

### 1.2 PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, all items shown in this section are Bobrick Products. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or approved equal:
  - 1. A & J Washroom Accessories
  - 2. American Specialties, Inc.
  - 3. Bobrick Washroom Equipment, Inc.
  - 4. Bradley Corporation
  - 5. General Accessory Manufacturing Co.
  - 6. McKinney/Parker
  - 7. Kimberly/Clark
  - 8. Georgia Pacific
- B. Materials, General: Fabricate toilet accessory items from the following materials and according to requirements specified for individual accessory items:
  - 1. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 0.034-inch (22-gage) minimum thickness, unless otherwise indicated.
  - 2. Brass: Leaded and unleaded, flat products, ASTM B 19; rods, shapes, forgings, and flat products with finished edges, ASTM B 16; Castings, ASTM B 30.
  - 3. Sheet Steel: Cold-rolled, commercial quality ASTM A 366, 0.04-inch (20-gage) minimum thickness, unless otherwise indicated. Surface preparation and metal pretreatment as required for applied finish.
  - 4. Galvanized Steel Sheet: ASTM A 527, G60.
  - 5. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.
  - 6. Baked Enamel Finish: Factory-applied, gloss white, baked acrylic enamel coating.

## SECTION 10800 - TOILET AND BATH ACCESSORIES

7. Mirror Glass: Tempered Glass Nominal 6.0-mm (0.23-inch) thick, conforming to ASTM C 1036, Type I, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.
  8. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
  9. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.
  10. Keys: Provide universal keys for access to toilet accessory units requiring internal access for servicing, resupply, etc. Provide a minimum of six keys to Owner's representative.
- C. Double-Roll Toilet Tissue Dispenser: Supplied by Owner and installed by G.C. (assume Georgia Pacific #59209 or approved equal for installation pricing).
- D. Surface Mounted Hand Dryer: Automatic sensor operated, 110-120V by Excel Dryer, Inc. Model XL-SB or approved equal (color selected by Owner/Architect).
- E. Waste Receptacle: Supplied by Owner and installed by G.C. (assume Rubbermaid #2956 and #3066 top or similar for installation requirements).
- F. Surface-Mounted Soap Dispenser: Supplied by Owner and installed by G.C. (assume Kimberly/Clark Model 92144 or similar for installation requirements).
- G. Surface-Mounted Napkin/Tampon Vendor: Supplied by Owner and Installed by G.C. (assume American Specialties, Inc. 0864 or similar for installation requirements).
- H. Surface-Mounted Sanitary Napkin Disposal: Supplied by Owner and Installed by G.C. (assume Bobrick B-270 or similar for installation requirements).
- I. Horizontal wall mounted Baby Changing Station: Koala Kare Products 'KB110-SSWM' or approved equal.
- J. Stainless Steel Grab Bars: Provide grab bars with wall thickness not less than .050 inch (18 gage), Bobrick Model B-6806 or approved equal and as follows:
1. Mounting: Concealed, manufacturer's standard flanges and anchorages.
  2. Clearance: 1-1/2-inch clearance between wall surface and inside face of bar.
  3. Gripping Surfaces: Smooth, satin finish.
  4. Heavy-Duty Size: Outside diameter of 1-1/2 inches.
- K. Stainless Steel Channel-Framed Mirror Units: Fabricate frame with channel shapes not less than 0.04 inch (20 gage), with square corners carefully mitered to hairline joints and mechanically interlocked. Provide in Type 430, bright polished finish. Bobrick Model B-165 Series or approved equal.
- L. Fabrication: Only a maximum 1-1/2-inch diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by means of either a waterproof, printed label or a stamped nameplate, indicating manufacturer's name and product model number.

## SECTION 10800 - TOILET AND BATH ACCESSORIES

- M. 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.
  
- N. Framed Mirror Units, General: Fabricate frames for tempered glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation, as follows:
  - 1. Provide galvanized steel backing sheet, not less than 0.034 inch (22 gage) and full mirror size, with non-absorptive filler material. Corrugated cardboard is not an acceptable filler material.
  
- O. Mirror Unit Hangers: Provide system of mounting mirror units that will permit rigid, tamperproof, and theft-proof installation, as follows:
  - 1. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

### 1.3 EXECUTION

- A. Installation: Install toilet accessory units according to manufacturers' printed installation instructions, using fasteners appropriate to substrate as recommended by unit manufacturer. Install units plumb and level, firmly anchored in locations and at heights indicated.
  - 1. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set the units plumb, level, and square at locations indicated, in accordance with manufacturer's instructions for type of substrate involved.
  - 2. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
  - 3. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION 10800



## SECTION 12241 - ROLLER WINDOW SHADES

### 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. Shade Type RS-1: Manual roller shades with single roller solar shades. Provide one (1) shade for every individual window sash.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
- C. Samples for Initial Selection: For each type and color of shadeband material.
  - 1. Include samples of accessories involving color selection.
- D. Samples for Verification: For each type of roller shade.
  - 1. Shadeband Material: Not less than 10 inches (250 mm) square. Mark inside face of material if applicable.
  - 2. Roller Shade: Full-size operating unit, not less than 12 inches wide by 12 inches long for each type of roller shade indicated.
  - 3. Installation Accessories: Full-size unit, not less than 10 inches (250 mm) long.
- E. Roller-Shade Schedule: Use same designations indicated on Drawings.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of shadeband material, signed by product manufacturer.
- C. Product Test Reports:

## SECTION 12241 - ROLLER WINDOW SHADES

1. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
2. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roller shades to include in maintenance manuals.

### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Installer trained and certified by the manufacturer having at least ten (10) years' experience installing products comparable to those specified in this section.
- B. Installer: must be an approved installer meeting all qualifications required by the manufacturer.

### 1.7 WARRANTY

- A. Roller Shade Hardware and Shadecloth: Manufacturer's standard non-depreciating twenty-five-year limited warranty for hardware and fabric.
- B. Roller Shade Installation: Two (2) years from date of substantial completion.

### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

### 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.



## SECTION 12241 - ROLLER WINDOW SHADES

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide MechoSystem's Manual Mecho/5 single roller shades or approved equal.
  - 1. MechoSystems, Inc. or approved equal.
- B. Acceptable Manufacturers:
  - 1. Levolor
  - 2. Draper, Inc.
  - 3. Approved equal
- C. Source Limitations: Obtain roller shades from single source from single manufacturer.

#### 2.2 MANUALLY OPERATED SOLAR SHADES WITH SINGLE ROLLERS

- A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated
  - 1. Bead Chains: Stainless steel
    - a. Loop Length: Full length of roller shade.
    - b. Limit Stops: Provide upper and lower ball stops.
    - c. Chain-Retainer Type: Standard Clip.
  - 2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller-shade weight and lifting heavy roller shades.
    - a. Provide for shadebands that weigh more than 12 lb or for shades as recommended by manufacturer, whichever criteria are more stringent.
- B. Rollers: Corrosion-resistant extruded-aluminum tubes of diameters and wall thicknesses required for accommodating operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
  - 1. Roller Drive-End Location: As indicated on Drawings.
  - 2. Direction of Shadeband Roll: Regular, from back of roller.
  - 3. Shadeband-to-Roller Attachment: Removable spline fitting integral channel in tube
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

## SECTION 12241 - ROLLER WINDOW SHADES

1. Brackets: Constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade
2. Plastics: Provide self-lubricating plastic for all plastic components of shade hardware.

### D. Shadeband Material:

1. Basis of Design: MechoSystems ThermoVeil 1500MB or approved equal
2. Type: 25% polyester base with 75% PVC coating.
3. Roll Width: Available in 63 inch, 96 inch, and 126 inch.
4. Coordinate requirements retained in "Orientation on Shadeband" Subparagraph below with requirements in "Roller-Shade Fabrication" Article. See "Shadebands" Article in the Evaluations for a discussion of up-the-bolt and railroaded fabrics.
5. Orientation on Shadeband: Provide options for owner approval.
6. Openness Factor: 3%.
7. Color: As selected by the Owner from manufacturer's full range.
8. Fabric must be NFPA 701 compliant.
9. Hembar: Steel or extruded aluminum.

### E. Installation Accessories:

1. Front Fascia: Provided by shade contractor.
  - a. SnapLoc Front Fascia: Aluminum extrusion that conceals front and underside of roller and operation mechanism and attaches to roller endcaps without exposed fasteners. Provide for all exposed shades.
  - b. Shape: L-shaped.
2. End Caps: To cover exposed end caps.

## 2.3 SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
  1. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible except as follows:
  1. Railroaded Materials: Railroaded materials due to material roll width not meeting window opening requirements will not be permitted.

## SECTION 12241 - ROLLER WINDOW SHADES

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 ROLLER-SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
  - 1. Opaque Shadebands: Located so shadeband is not closer than 2 inches (51 mm) to interior face of glass. Allow clearances for window operation hardware.

#### 3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

#### 3.4 CLEANING AND PROTECTION

- A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

#### 3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades.

END OF SECTION 12241



## SECTION 12300 - PLASTIC LAMINATE CASEWORK

### I. GENERAL

#### 1.01 SCOPE OF WORK

- A. Provide all plastic laminate casework and accessory items as specified herein. Refer to plans for specific details and requirements.
- B. General Conditions: The General Conditions, Supplementary General Conditions, Special Conditions, and General Requirements apply to all work in this Division.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. General millwork and custom cabinetry unless specified herein or so noted on plans as included within this section.
- B. Rubber, vinyl or other finished toe base.
- C. Locks master keyed to room doors and other special locks.
- D. Blocking within walls.
- E. Sinks, faucets, fittings, traps, stops, tail pieces, vacuum breakers, and other fixtures, electrical and mechanical runs and connections.
- F. Fixture installation/services connections: Setting and installation of equipment and fixtures, and related utility connections, are provided under the other sections of the Project Specification governing that utility.

#### 1.03 SUBMITTALS

- A. Submit in accordance with General, Supplementary, and Special Conditions.
- B. Submit shop drawings for approval in accordance with Specification Section 01300, "Submittals". Show materials, dimensions, cabinet-cut details, and sink locations.
- C. Samples of colors shall be submitted to the Owner upon award of contract for selection and coordination with other suppliers. Owner / Architect may request and retain samples and catalog cuts as required for accessory and special items.

#### 1.04 QUALIFICATIONS

- A. Drawings and specifications are based upon casework as manufactured by LSI Corporation of America, Inc., or approved equal. Construction and design shall be LSI NewCentury™ L44 Series. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.
- B. Casework of other nationally recognized casework manufacturers will be considered for approval during the Shop Drawing process in accordance with Specification Section 01300, "Submittals". Casework must conform to design, quality of materials, design intent, workmanship and exact performance function of casework components and details specified and implied by manufacturer's reference, and as shown on plans regardless of that manufacturer's "product standards".

## SECTION 12300 - PLASTIC LAMINATE CASEWORK

- C. Manufacturers requesting approval shall submit evidence of at least 5 years experience and installations for similar type of project. Manufacturers shall also show evidence of financial stability, plant facilities, catalogs, and specifications. Full-sized samples, catalogs, and specifications shall be submitted with written request along with detailed list of compliance and deviations from these documents for approval. Samples may be impounded by Owner and retained until completion of job for verification and compliance of specifications.
- D. In addition to the above requirements, manufacturers listed herein, or requesting approval, shall submit proof of ability to provide Certificate of Compliance in AWI, Architectural Woodwork Institute Quality Certification Program, including QCP labels on finished goods.
- E. The following performance details are project requirements and must be met by all Bidders whether named herein, regardless of that Manufacturer's "Standards". Deviations from the minimum standards listed below will not be allowed.
1. Lamination System: Doors, finished end panels, and other decorative exterior laminate surfaces shall be laminated exterior with .028 inch (.71 mm) high-pressure plastic laminate, and interior with .020 inch (.51 mm) high-pressure cabinet liner. Lamination with hybrid P.V.A. Type III water resistant adhesive.
  2. Structural Cabinet Body: Cabinet backs shall be minimum 1/2 inch (12.7 mm) thick, inset from rear of body, and fully bound (dadoed) four sides. Provide 3/4 inch (19.1 mm) thick stiffeners fastened to back/body as specified herein. Back perimeter shall be toe-nailed with mechanical fasteners for tight interior fitment and direct connection of back panel to body, and sealed with full-perimeter high-strength hot-melt adhesive.
  3. Interior Structure: All cabinets over 36 inches (914 mm) wide shall be furnished with a mechanically fastened vertical divider to reduce horizontal member/shelf deflection. Wall cabinets shall have a clear inside nominal depth of 12 inches (305 mm) unless detailed otherwise.
  4. Shelf Loading: Shelves shall meet the loading/deflection standards of the National Particleboard Association.
  5. Structural Drawer Body: Drawer body shall be doweled with 1/2 inch (12.7 mm) typical bottom, recessed, fully bound (dadoed) and joint-glued all four sides. Provide under body stiffeners as specified herein.
  6. Drawer Suspension: Drawer Slides: BHMA A156.9, Type B05091.
    - a. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated, steel ball-bearing slides.
    - b. Grades in five subparagraphs below correspond to the following initial load test requirements: Grade 2: 30 lb (13.3 kg); Grade 1: 50 lb (22.2 kg); Grade 1HD-100: 100 lb (44.5 kg); Grade 1HD-200: 200 lb (90 kg).

## SECTION 12300 - PLASTIC LAMINATE CASEWORK

- c. Box Drawer Slides: Grade 1, for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
  - d. File Drawer Slides: Grade 1HD-100, for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.
  - e. Pencil Drawer Slides: Grade 1, for drawers not more than 3 inches (75 mm) high and 24 inches (600 mm) wide.
  - f. Keyboard Slides: Grade 1HD-100, for computer keyboard shelves.
7. Structural Cabinet Support: Cabinet sub-base shall be of a separate and continuous ladder-type platform design, leveled and floor mounted prior to cabinet body placement. Material shall be exterior grade plywood. No cabinet sides-to-floor will be allowed.
- F. Architect/Owners opinion and decision shall be final in the evaluation of manufacturer's products for approval of a substitute product during the Shop Drawing process.

### 2.00 PRODUCTS

#### 2.01 MATERIALS

- A. Laminated Plastics/Finishes:
- 1. High-pressure plastic laminate, .028 inch (.71 mm) in thickness, for exterior surfaces shall meet NEMA LD3-2000 VGS standards including thickness.
  - 2. Exterior Color Selection Available:
    - a. Standard finish from casework manufacturer's standard stock colors consisting of wood grain patterns and solid colors. Minimum of 200 selections available.
    - b. Total of 5 different colors available per project.
    - c. Direction of wood grain shall be vertical on door, end panels, fascia panels, and exposed backs; horizontal on drawer faces, aprons, and top rails.
  - 3. Plastic Laminate Balancing Sheet: White high-pressure cabinet-liner, .020 inch (.051 mm) in thickness shall meet NEMA LD3-2000 CLS standards. Use for balancing exterior surface laminates.
  - 4. Countertop High-Pressure Plastic Laminate:
    - a. High-pressure plastic laminate, textured finish .048 inch (1.22 mm) thickness or .042 inch (1.07 mm) post forming grade as detailed. Color as selected from manufacturer's stock standard patterns and solid colors.

## SECTION 12300 - PLASTIC LAMINATE CASEWORK

- b. Heavy gauge neutral colored backing sheet for balanced construction.
- 5. Pressure Fused Laminate:
  - a. Melamine resin impregnated, 85 gram PSM average, thermofused to core under pressure.
  - b. Shall meet NEMA LD3-2000 VGL standards and NEMA LD3-2000 CLS standards, except thickness.
  - c. White pressure fused laminate for cabinet interiors behind door and drawers, interiors of all open cabinets, and underside of wall cabinets.
  - d. Shall be balanced at all concealed surfaces with same thermofused melamine. Unsurfaced coreboard or simple backers not allowed.
- B. High Performance Core:
  - 1. Shall be particleboard, minimum 47 lb. (21.3 kg) density, of balanced 3-ply construction with moisture content not to exceed 8%. Particleboard shall conform to ANSI A208.1-1999, Grade M-3.
  - 2. Cabinet components shall be of the following minimum core thicknesses:
    - a. 1/2 inch (12.7 mm): cabinet backs, drawer body, and drawer bottoms.
    - b. 3/4 inch (19.1 mm): door and drawer face, base, wall, and tall cabinet tops and bottoms, cabinet sides, drawer spreaders, cabinet back rear hang strips, structural dividers, exposed cabinet backs, and shelves of less than 30 inch (762 mm) span.
    - c. 1 inch (25.4 mm): product-specific work surfaces and library stack shelving unless stack fitted with vertical divider. Shelves over 30 inch (762 mm) span.
- C. Edging types. Provide one or more of the following in accordance with "Edging Locations":
  - 1. FlatEdge PVC/ABS. .020 inch (.51 mm). Solid, high-impact, purified, color-thru, acid resistant PVC/ABS edging machine-applied with hot melt adhesives, automatically trimmed face, back and corners for uniform appearance.
  - 2. (3) mm thick PVC/ABS. Solid, high-impact, purified, color-thru, acid resistant, pre-lamination primed edging, machine-applied with hot melt adhesives, automatically trimmed, inside/outside length-radiused for uniform appearance, buffed and corner-radiused for consistent design.
- D. Edging Locations. Provide the above specified edging types at the following locations, of the following colors:
  - 1. Door/Drawer-Front edging: 3mm PVC/ABS selected from 30 standard LSI colors, color matched to LSI standard laminates.



## SECTION 12300 - PLASTIC LAMINATE CASEWORK

2. Cabinet body front-facing edge, including door/drawer front spacer rail: FlatEdge PVC/ABS, color matched to door/drawer face or as selected.
  3. Front-facing edge of interior body components, interior dividers, shelf, and top edges of drawer body: FlatEdge PVC/ABS to match adjacent interior surface color.
- E. Hardware
1. Hinges:
    - a. Heavy duty, five knuckle 2 3/4 inch (69.9 mm) institutional type hinge shall meet ANSI/BHMA A156.9 Grade 1 requirements. Mill ground, hospital tip, Teflon coated tight pin feature with all edges eased. Hinge shall be full wrap around type .095 inch (2.4 mm) thick. Each hinge shall have minimum of 9 screws, #7, 5/8 inch (15.9 mm) FHMS to assure positive door attachment.
    - b. One pair per door to 48 inch (1219 mm) height, One and one-half pair over 48 inches (1219 mm) in height. Hinge shall accommodate 13/16 inch (20.6 mm) thick laminated door and allow 270 degree swing.
    - c. Finish shall be LH-301 ChromeCoat Powder Finish, LH-302 Black, LH-303 White, LH-304 Dove Grey, LH-305 Haze, or LH-306 Light Beige epoxy coated.
  2. Pulls:
    - a. Wire design, LH-321, 4 inches (101.6 mm), in ChromeCoat powder finish, High-Polish Chrome or Brass.
    - b. Wire design, LH-325 nylon, 4 inches (101.6 mm), in White, Dove Grey, or Black.
    - c. LSI Signature Series LH-331 (or approved equal) semi-recessed design, 5 1/4 inches x 1 3/4 inches (133 mm x 44.5 mm), in Dove Grey, Black, White, Haze, and Light Beige. Pull design shall be in compliance with the Americans with Disabilities Act, Federal Register Volume 56, no. 144, Rules and Regulations. Similar pulls by Baer Supply #ME 497608 or Haeefele #151.35 may be acceptable pending Architectural approval. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.
  3. Sliding Door Hardware:
    - a. Frameless 1/4 inch (6.4 mm) glass sliding doors: LH-370 double track rolling door assembly.
    - b. Framed 13/16 inch (20.6 mm) thick stile and rail sliding doors: LH-372 (or approved equal) top mounted track with dual roller hangers. Vertical adjustment for accurate alignment.

## SECTION 12300 - PLASTIC LAMINATE CASEWORK

4. Drawer Slides:
  - a. Standard Drawers: LSI Lab Series Slide, LH-375 (or approved equal), self-closing design, epoxy powder coated White, with positive in-stop, out-stop, and out-keeper to maintain drawer in 80% open position. Captive nylon rollers, front and rear. Minimum 100 lb (45 kg) dynamic load rating at 50,000 cycles.
  - b. File Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb (45 kg), zinc plated or epoxy coated at manufacturer's option.
  - c. Provide body mounted molded rails for hanging file system for legal or letter size as indicated by manufacturer's model number. Cutting or machining of drawer body/face not allowed.
  - d. Paper Storage Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb (45 kg), zinc plated or epoxy coated at manufacturer's option.
5. Catches: Catch shall provide opening resistance in compliance with the Americans with Disabilities Act.
  - a. Provide top-mounted magnetic catch for base and wall cabinet door. Provide two at each tall cabinet door. Catch housing shall be molded in White. LH-340ADA (or approved equal).
6. Adjustable Shelf Supports: Shall be LH-354.1 twin pin design with anti tip-up shelf restraints for both 3/4 inch (19.1 mm) and 1 inch (25.4 mm) shelves. Design shall include slot for ability to mechanically attach shelf to clip. Load rating shall be minimum 300 lbs. (136 kg) each support without failure. Cabinet interior sides shall be flush, without shelf system permanent projection.
7. Wardrobe Rod: Shall be 1 1/16 inch (27 mm) rod, LH-362, supported by LH-363 flanges.
8. Coat Hooks:
  - a. Single coat hooks, wall mount - LH-365 Bright Zinc (or approved equal).
  - b. Double coat hooks, wall mount - LH-366 Bright Zinc (or approved equal).
  - c. Double coat hooks, ceiling mount – LH-368 Bright Zinc (or approved equal).
9. Molded Trays:
  - a. High-impact Polyethylene with cardholders. Color, White.

## SECTION 12300 - PLASTIC LAMINATE CASEWORK

- b. Sizes: 10 1/2 inches W x 3 1/2 inches H x 19 inches D (267 mm W x 89 mm H x 483 mm D), 14 1/2 inches W x 3 1/2 inches H x 19 inches D (368 mm W x 89 mm H x 483 mm D)
    - c. Trays shall glide on molded, twin pin side rails, adjustable 1 1/4 inches (32 mm) on center. Color, White.
  - 10. Molded Personal Pencil Drawer: High-impact 100 Polystyrene with in-stop, out-stop, and self-closing features. Provide under top mounted 100 lb (45 kg) self-closing slides. Twelve compartment drawer body, and slides, Black. Provide where indicated on plans as "molded pencil drawer".
  - 11. Locks: Provide at all doors and drawers, shall be disc tumbler lock keyed alike and master keyed. Dull chrome finish.
    - a. Hinged doors and drawers National Lock No. M4-7054 (or approved equal)
    - b. Sliding doors, 13/16 inch (20.6 mm) thick, National Lock No. M4-0057 (or approved equal).
    - c. 1/4 inch (6.4 mm) sliding panel doors, National Lock No. M2-0225 (or approved equal).
  - 12. Keyboard Tray
    - a. Articulating keyboard trays, quantity and location as shown on architectural drawings, shall be adjustable for height, tilt, and back slope and allow 360 degree arm swivel. Slide out tray shall have low profile design for storage. BIFMA 100# rating. Tray size: 20 3/4 inch x 10 1/4 inch (527 mm x 260 mm). Color: Black.
    - b. Optional mouse tray (where shown) for either right or left-handed use.
- F. Detailed Requirements For Cabinet Construction:
  - 1. Sub-Base:
    - a. Cabinet sub-base shall be separate and continuous (no cabinet body sides-to-floor), water resistant exterior grade plywood with concealed fastening to cabinet bottom. Ladder-type jobsite construction of individual front, back, and intermediates, to form a secure and level platform to which cabinets attach.
    - b. Sub-base at exposed cabinet end panels shall be recessed 1/4 inch (6.4 mm) from face of finished end, for flush installation of finished base material by other trades.
  - 2. Cabinet Top and Bottom:
    - a. Solid sub-top shall be furnished for all base and tall cabinets.
    - b. At cabinets over 36 inches (914 mm), bottoms and tops shall be mechanically joined by a fixed divider.

## SECTION 12300 - PLASTIC LAMINATE CASEWORK

- c. Exterior exposed wall cabinet bottoms shall be white pressure fused laminate both sides. Assembly devices shall be concealed on bottom side of wall cabinets.
3. Cabinet Ends:
  - a. Holes drilled for adjustable shelves 1 1/4 inches (32 mm) on center.
  - b. Exposed exterior cabinet ends shall be laminated with high-pressure plastic laminate, balanced with high-pressure cabinet-liner interior surface.
4. Fixed And Adjustable Shelves:
  - a. Thickness shall be 3/4 inch (19.1 mm) at standard cabinetry, and 1 inch (25.4 mm) at library stack shelving.
5. Cabinet Backs:
  - a. Cabinet back shall be fully bound (dadoed) into sides, top, and bottom, recessed 7/8 inch (22.2 mm) from cabinet rear. Rear, unexposed, side of back shall be toe-nailed to cabinet body with mechanical fasteners and solidified with a continuous bead of industrial grade hot melt adhesive.
  - b. Hang rails shall be located at rear of cabinet back and fastened to cabinet sides. Provide minimum of 2 at base, 2 at wall, and 3 at tall cabinets.
  - c. Exposed exterior backs shall be high-pressure plastic laminate balanced with high-pressure cabinet-liner.
6. Door And Drawer Fronts:
  - a. Laminated door and drawer fronts shall be 13/16 inch (20.6 mm) thick for all hinged and sliding doors. Drawer fronts and hinged doors shall overlay the cabinet body. Maintain a maximum 1/8 inch (3.2 mm) reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
  - b. Stile and Rail doors shall be 13/16 inch (20.6 mm) thick with full 1/4 inch (6.4 mm) plate glass. Available hinged or sliding. All exposed lite-opening edges shall be trimmed and glazed with extruded glazing bead.
  - c. Frameless sliding glass doors shall be 1/4 inch (6.4 mm) thick plate glass with ground and polished edges. Fit with anodized aluminum shoes and nylon rollers.
7. Drawers:
  - a. Drawer fronts shall be applied to separate drawer body component sub-front.

## SECTION 12300 - PLASTIC LAMINATE CASEWORK

- b. Drawer sides shall be doweled and glued to receive front and back, machine squared and held under pressure, to set.
  - c. Drawer bottom shall be fully bound (dadoed) into front, sides, and back. Routing, in drawer body for bottom, shall receive glue. Reinforce drawer bottoms with 1/2 inch (12.7 mm) x 4 inch (101.6 mm) front-to-back intermediate underbody stiffeners, mechanically fastened. One at 24 inches (610 mm), two at 36 inches (914 mm), and four at 48 inches (1219 mm).
  - d. Paper storage drawers shall be fitted with full width hood at back.
8. Vertical and Horizontal Dividers: One of the following as indicated by cabinet number:
- a. Natural hardboard 1/4 inch (6.4 mm) thick, smooth both faces. Secured in cabinet with molded plastic clips.
  - b. Pressure Fused laminate 3/4 inch (19.1 mm) thickness. Sub-dividers secured in cabinet with molded plastic clips or dowels. Structural dividers in cabinets over 36 inches (914 mm) wide secured in cabinet with mechanical euro fasteners.
9. Door/Drawer Front Rail: Provide minimum 3/4 inch (19.1 mm) x 6 inch (152 mm) x full width cabinet body rails immediately behind all door/drawer and multiple drawer horizontal joints to maintain exact body dimensions, close off reveal, and be locator for lock strikes.
10. ADA, Americans with Disabilities Act Requirements: The following special requirements shall be met, where specifically indicated on architectural plans as "ADA", or by General Note. Shall be in compliance with Federal Register Volume 56, No. 144, Rules and Regulations:
- a. Countertop height: With or without cabinet below, not to exceed a height of 34 inches (864 mm) A.F.F., (Above Finished Floor), at a surface depth of 24 inches (610 mm).
  - b. Kneespace clearance: Shall be minimum 29 inches (737 mm) A.F.F. at apron, and 30 inches (762 mm) clear span width.
  - c. 12 inch (305 mm) deep shelving, adjustable or fixed: Not to exceed a range from 9 inches (229 mm) A.F.F. to 54 inches (1372 mm) A.F.F.
  - d. Wardrobe cabinets: Shall be furnished with rod/shelf adjustable to 48 inches (1219 mm) A.F.F. at a maximum 21 inch (533 mm) shelf depth.
  - e. Sink cabinet clearances: In addition to above, upper kneespace frontal depth shall be no less than 8 inches (203 mm), and lower toe frontal depth shall be no less than 11 inches (279 mm), at a point 9 inches (229 mm) A.F.F., and as further described in Volume 56, Section 4.19.

## SECTION 12300 - PLASTIC LAMINATE CASEWORK

### G. Countertops:

1. High-pressure plastic laminate bonded to core. 1 ¼" thick 45lbs particleboard. Underside shall be properly balanced with heavy gauge backing sheet. Furnish countertops with 3mm PVC edge. Provide tops in as long as practical continuous lengths. Provide field glued splines at joints. No joints closer than 24 inches (610 mm) either side of sink cutout.
2. Mobile cabinet tops shall be high-pressure plastic laminate on exterior and high-pressure cabinet-liner on underside. Edges shall be high-impact 3 mm PVC.
3. Countertop Grilles: Fully framed drop-in anodized aluminum. Frame to have 3/8" radius and be one piece. Provide at lengths and at locations as indicated on drawings.
4. Toe kick grilles: Perforated flat black anodized aluminum. Provide in equal lengths and quantity to counter top grilles. Vinyl cove between grilles by flooring contractor.

### H. Workmanship:

1. All exposed vertical exterior cabinet surfaces shall be .028 inch (.71 mm) high-pressure laminate, color as selected from casework manufacturer's standards, over 200 colors/wood grains available. Laminate surface/balancing liner to core under controlled conditions by approved and regulated laminating methods to assure a premium lamination. Natural-setting hybrid P.V.A. Type III water resistant adhesives that cure through chemical reaction, containing no health or environmentally hazardous ingredients, are required. Methods requiring heat are not allowed; "contact" methods of laminating are not allowed.
2. Cabinet parts shall be accurately machined and bored for premium grade quality joinery construction utilizing automatic machinery to insure consistent sizing of modular components. End panels shall be doweled to receive bottom and top.
3. Back panel shall be fully bound (dadoed) into, and recessed 7/8 inch (22.2 mm) from the back of cabinet sides, top, and bottom to insure rigidity and a fully closed cabinet. Cabinet back shall be mechanically fastened from rear of body for tight interior fit and sealed with full-perimeter high-strength hot-melt adhesive.
4. Drawer bottom shall be fully bound (dadoed) and glued into and recessed 1/2 inch (12.7 mm) up from the bottom of sides, back, and sub-front. Sides of drawer shall be doweled to receive drawer back and sub-front.
5. 3/4 inch (19.1 mm) thick hang rails shall be mechanically fastened to end panels of all wall, base, and tall cabinets for extra rigidity and to facilitate installation.
6. All cases shall be square, plumb, and true.

## SECTION 12300 - PLASTIC LAMINATE CASEWORK

7. Case body and drawer workmanship and quality of construction shall be further evidenced by manufacturer being certified in the AWI Quality Certification Program.
8. Provide removable back panels and closure panels for plumbing access at all sink cabinets, and where shown on drawings.

### 2.02 STEEL FABRICATIONS, ASSEMBLIES, AND SUPPORT DEVICES:

Provide, of the size and configuration as detailed, or as indicated by product number. Exposed welds shall be ground smooth. Finish shall be Black Powder Coat.

- A. C-Frame Bench and Table Assemblies: Shall be constructed of 1 1/2 inch (38.1 mm) wide x 2 1/2 inch (63.5 mm) deep 12 gauge (2.66 mm) steel tube, corner welded, and ground smooth. Provide 3/8 inch (9.5 mm) diameter levelers with non-rusting foot pads. Horizontal connectors shall be 1 1/2 inch x 1 1/2 inch (38.1 mm x 38.1 mm) 12 gauge (2.66 mm) bolted to vertical C-frames. Table frames with laminate back panel horizontal connectors shall incorporate 1 inch x 1 inch (25.4 mm x 25.4 mm) channel, to receive panel.
- B. Steel Support Legs at Cabinet Assemblies: Shall be 2 inch x 2 inch (50.8 mm x 50.8 mm) 12 gauge (2.66 mm) steel with welded top or side plate according to product design. Provide 3/8 inch (9.5 mm) diameter leveler with non-rusting foot pad of tear drop design for floor attachment, and leg shoe according to product design.
- C. Cantilevered Work Top Support Bracket: Shall be of 1 1/2 inch x 1 1/2 inch (38.1 mm x 38.1 mm) 12 gauge (2.66 mm) steel vertical, welded and ground smooth to 1 1/2 inch wide x 2 1/2 inch deep (38.1 mm x 63.5 mm) 12 gauge (2.66 mm) horizontal, of the overall size as indicated on contract documents, or as designated by product number. Provide molded cap inserts at wall and countertop fastener holes.
- D. Angular Work Top Support Bracket: Shall be factory welded 1 1/2 inch x 1/4 inch (38.1 mm x 6.4 mm) flat steel of vertical, horizontal, and angular design according to size indicated on contract documents, or designated by product number.

## 3.00 EXECUTION

### 3.01 COORDINATION

- A. Coordinate work of this Section with related work of other Sections as necessary to obtain proper installation of all items.
- B. Verify site dimensions of cabinet locations in building prior to fabrication.

### 3.02 INSTALLATION

- A. Storage and Protection: Casework shall be protected in transit. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes. Do not store or install casework in building until concrete, masonry, and drywall/plaster work is dry.

SECTION 12300 - PLASTIC LAMINATE CASEWORK

- B. Workmen: Install casework under the supervision of the manufacturer's representative with factory-trained mechanics certified by manufacturer.
- C. Workmanship:
  - 1. Erect casework straight, level and plumb and securely anchor in place. Scribe and closely fit to adjacent work. Cut and fit work around pipes, ducts, etc.
  - 2. Install all items complete and adjust all moving parts to operate properly.
  - 3. Leave surfaces clean and free from defects at time of final acceptance.
- D. Guarantee: All materials shall be guaranteed for a period of 5 years from manufacturer's defects and workmanship.
- E. Clean Up: Remove all cartons, debris, sawdust, scraps, etc., and leave spaces clean and all casework ready for Owner's use.

LSI ProtectorShield™ Shelf System (or approved equal): Patented.

END OF SECTION



## SECTION 15010 – GENERAL REQUIREMENTS

### PART 1 GENERAL

#### 1.01 SCOPE

1. The General, Supplementary, and Special Conditions, applicable portions of all divisions and the addenda thereto, are made a part of this Contract.
2. All work described in these specifications shall be the responsibility of the mechanical contractor unless otherwise indicated.
3. It is the intent of these specifications to include all material, service and labor necessary to form a complete and properly operating whole.

#### 1.02 CONTRACT DRAWINGS

1. Examine all drawings and specifications and visit the site to become acquainted with the construction and the extent of the work.
2. In referring to drawings, figured dimensions take precedence over scale measurements. Discrepancies must be referred to the Engineer for decision. Each Contractor shall certify and verify all dimensions before ordering material or commencing work.
3. 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, shall be furnished as though called for in both. When there is a discrepancy between drawings and specifications, the most considerable shall apply.
4. When any device or part of equipment is herein referred to into singular number, such as "the pump" such reference shall be deemed to apply to as many such devices as required to complete the installation.
5. The term "provide" shall mean "furnish and install". Neither term will be used generally in these specifications but will be assumed. The term "furnish" shall mean to obtain and deliver on the job for installation by other trades.

#### 1.03 CODES AND STANDARDS

1. All work shall comply with all regulations and latest edition of applicable codes and be subject to inspection and approval of authorities having jurisdiction.
2. All electrical work shall comply with latest edition of the NEC National Electrical Code.
3. Where items indicated on contract documents differ from code requirements, contractor shall inform engineer prior to installation. Any construction installed by contractor that is not in compliance with applicable codes, shall be removed, modified, and/or replaced at not additional cost.
4. All equipment shall be labeled by an applicable approved agency.
5. Contractor shall give all notices, obtain and pay for all permits, deposits, and fees necessary.

## SECTION 15010 – GENERAL REQUIREMENTS.

6. Manufacturer's published data is made a part of these specifications.
7. Wherever a recognized national organization has published standards, these shall be complied with (such as ASA Z 21.30 for gas piping).

### 1.04 SCOPE OF WORK

1. It is the intent of these specifications to include all material, service and labor necessary to form a complete and properly operating whole system.

### 1.05 SHOP DRAWINGS AND SUBMITTALS

1. See Specification Section 01300 – Submittals.
2. Ductwork and piping shop drawings shall be prepared using Auto Cad 2000 or latest edition of Auto Cad @ 1/4" scale (minimum).

### 1.06 EQUIPMENT DEVIATIONS

1. The material and products mentioned in these specifications are given to establish a standard of quality, design and performance. The phrases "equivalent", "acceptable", "or equal" and "equal to" shall be used to indicate that other similar products may be used and provided in accordance with "General Conditions", where applicable, such substitutes are accepted by the Architect as meeting all standards necessary to perform the function intended. Specific products listed without reference to equals or substitutions shall be provided as specified.
2. Where this Contractor proposes to use methods and/or manufacturer other than that specified or detailed on drawings, which will require any changes of the structure, partitions, foundations, piping, wiring or any other part of the design documents, all design, engineering and any new drawings and detailing required by other contractors and/or professionals shall be paid by this Contractor at no additional cost to Owner.
3. Where such deviation requires a different quantity and/or arrangement of duct work, piping, electrical work, wiring conduit and/or equipment that would have been required for equipment specified or indicated on the drawings. This Contractor shall with the approval of the Engineer provide all material, equipment and labor required by the change at no additional cost to the Owner.
4. Where such approved deviation requires a change to the structure, electrical, plumbing or any other Contractor's or Sub-Contractor's work, or any change to the construction as indicated on the design documents. This Contractor shall pay for all costs incurred due to such deviations at no additional cost to the Owner.

### 1.07 WARRANTY

1. Provide as part of contract, all belts and other normally replaceable items found defective at start up and/or for a period of 60 days operation equivalent run time. Owner is responsible for normal belt and filter replacement after initial 60 day breaking in period. This does not relieve contractor for replacement of damaged equipment, belts, etc. which are not a result of normal usage.

## SECTION 15010 – GENERAL REQUIREMENTS.

2. See Specification Section 01740 – Warranties and the A201 General Conditions of the Contract for Construction.
3. At the expiration of the factory warranty period, provide a factory warranty agreement, to include full coverage, parts and labor, plus emergency service for the new packaged rooftop air conditioning units for an additional three (3) year period, for a total of five (5) years of factory warranty.
4. Filter Change - See Specification Section 15010 “Filter Changes”.

### 1.08 AS-BUILT DRAWINGS

1. See Specification Section 01700 – Project Closeout.

### 1.09 FIRE RATING

1. All materials used anywhere in the work must have N.F.P.A. rating and be in accordance with ASTM-E-84 as follows:
  - A. Flame Spread - Not Over 25
  - B. Smoke Developed - Not Over 50
  - C. Fuel Contributed - Not Over 25
2. All materials shall be "Self Extinguishing".

### 1.10 EQUIPMENT SELECTION AND SERVICEABILITY

1. All equipment shall be located and installed so that it may be serviced. Demonstrate to Owner as part of instructions that there is room to remove all coils, tube bundles, filters, motor and similar equipment. Equipment which is too large or poorly located to permit servicing shall be replaced or repositioned or modifications made to allow for proper servicing at no additional cost to the Owner.
2. Where piping, control diagrams and/or sequencing differ from the recommended piping arrangements of the equipment manufacturer, and will directly affect the equipment performance, the manufacturer's recommendations shall be submitted in writing to the Architect/Engineer for approval, prior to purchasing the equipment involved and piping arrangement, control, etc., as recommended by manufacturer shall be used. This Contractor shall be responsible for obtaining such recommendations from the manufacturers in order to effect correct and proper operation of the equipment at the capacities and temperatures indicated.

### 1.11 MAINTENANCE SERVICE

1. Contractor shall furnish complete parts and labor service and maintenance of all HVAC systems, equipment, devices, controls, etc., for two (2) years from Date of Substantial Completion as determined by Architect.
2. Provide scheduled maintenance service with three (3) month interval as maximum time period between scheduled service or as indicated elsewhere (applicable only if less than 3-month intervals).

SECTION 15010 – GENERAL REQUIREMENTS.

3. Provide 24-hour emergency service on breakdowns and malfunctions.
4. Include maintenance items as outlined in manufacturer’s operating and maintenance data.
5. Submit copy of service call work order or report and include description of work performed. Handwritten report acceptable at time of service. Type written report to be provided to Owners’ maintenance staff within two (2) weeks of service call.
6. See Specification Section 15930 for additional requirements for control system.

1.12 FACTORY TESTING (BY UNIT MANUFACTURER)

1. All factory assembled packaged equipment shall be factory tested including helium leak testing of the coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. A certified factory Run test report shall be provided for each unit. **The “Run Test Report” shall be submitted to Owner for approval, prior to acceptance of unit for payment.**

1.13 EQUIPMENT FURNISHED BY OTHER TRADES

1. All equipment furnished and/or installed by other trades requiring connections and services by this Contractor shall have such services provided by this Contractor.
2. This Contractor shall verify exact requirements with approved shop drawings supplied by the Equipment Contractor and/or Supplier prior to construction.
3. This Contractor shall verify locations, sizes and requirements of all services to equipment, in field with the Equipment Contractor prior to construction.

**PART 2 PRODUCTS**

2.01 ELECTRICAL EQUIPMENT

1. This Contractor shall furnish all his equipment complete with motor, controllers, capacitors and starting equipment.
2. Electric motors shall be premium high efficiency, open, drip proof induction motors premium high efficiency rated for continuous duty at 15% overload with 40° C. rise; single phase motor shall be capacitor start-induction run. Motors one-half and larger shall be polyphase, motors smaller than one-half horsepower shall be single phase, unless otherwise noted (see Division 16). Starting equipment shall consist of magnetic across-the line starters equal to Furnas Bulletin 14, unless otherwise specified. Thermal overload type, motor rated manual switches shall be furnished for motors ¾ HP and less which do not require magnetic starters for control purposes.

<u>SIZE/HP</u>	<u>1800 RPM ODP NOMINAL EFFICIENCY</u>	<u>NEMA 1800 RPM TEFC NEMA NOMINAL EFFICIENCY</u>
1	85.5%	85.5%
1.5	86.5%	86.5%

## SECTION 15010 – GENERAL REQUIREMENTS.

3. Provide FPE/CDE Type 1C Power Factor correction capacitors size to increase full load power factor to 95%. Capacitors shall be fused, in NEMA enclosure, connected between safety switch and motor starter.
4. Where apparatus is specified as "Packaged", all electrical equipment shall be furnished, set and wired to a single point of connection for apparatus as a unit.
5. This Contractor shall set all electrical equipment furnished by him unless same is to be mounted on an electrical panelboard, junction box or similar piece of electrical equipment and is to be wired by others.
6. Where electrical characteristics are not shown, all electrical characteristics shall be as indicated on electrical plans. Where there is a conflict between model numbers which indicate electrical characteristics and electrical drawings, the electrical drawings shall take precedent.
7. This Contractor shall verify all electrical characteristics of all equipment with the electrical contractor. This Contractor shall submit to electrical contractor location of all motors, starters, all other electrical equipment, voltage and phase required prior to submission of this Contractor's and/or electrical contractors' shop drawings or start of construction. This Contractor shall submit to the electrical contractor all equipment requiring electrical services and obtain the review of the shop drawings for correct electrical characteristics for the electrical contractor prior to submission for review.
8. Should this Contractor change type of equipment which results in change to electrical characteristics, then this Contractor will be responsible to coordinate these changes with all other trades and pay for all costs required as a result of changes.
9. Should this Contractor change electrical characteristics of equipment from that shown on electrical drawings or does not submit shop drawings to the electrical contractor for his review, he is responsible for all cost required, resulting from such change or failure to submit shop drawings.

### 2.02 ELECTRICAL WIRING

1. This Contractor shall furnish and install all electric power wiring required for his contract, with the exception of certain wiring shown under Electrical Contract. This contractor shall furnish and install all control wiring required for his contract including power wiring to all ATC devices, panels, etc.

## PART 3 EXECUTION

### 3.01 METHOD OF PROCEDURE

1. The drawings accompanying these specifications are diagrammatic and intended to cover the approximate and relative locations of the systems. Where FMCS plenum-rated cable wiring is allowed it shall be run parallel to or at right angles to the structure, properly supported and installed in a neat and workmanlike manner.
2. Installation, connection and interconnection of all components of these systems shall be complete and made in accordance with the manufacturers instructions and best trade practices.

## SECTION 15010 – GENERAL REQUIREMENTS.

This Contractor shall erect all parts of equipment to be furnished by him under his contract in such time and in such a manner as not to delay or interfere with other Contractors work.

3. This Contractor shall lay out his work and be responsible for the establishment of heights, grades, etc., for all interior and exterior piping, equipment, conduit, duct work etc., included in Contract Documents, in strict accordance with the intent expressed thereby. The establishment of the location of all work shall be performed in consideration of the finished work. In case of conflict, equipment and/or materials shall be relocated without additional cost to the Owner, as directed by the Architect, regardless of which equipment was installed first.
4. Each contractor shall cooperate with other Contractors for the proper securing and anchoring of all work included within these specifications. Extraordinary care shall be used in the erection and installation of all equipment and materials to avoid marring surfaces of the work of other Contractors, as each Contractor will be held financially responsible for all such damage caused by the lack of precaution and due to negligence on the part of his workmen.

### 3.02 EQUIPMENT IDENTIFICATION

1. All HVAC equipment, control panels and starters shall have engraved plastic equipment tags. Tags shall be 1/16" plastic with mounting holes or adhesive backing to allow tags to be permanently mounted to equipment. Indication shall be for the equipment number, usage and location and where applicable circuit numbers and panel for electrical feed served. Equipment number shall be per the contract documents or where different numbering system is used by the contractor, the number system shall be per as-builts, O & M manuals and/or control drawings. Areas served shall be per room name and number (if applicable) based on architectural plans; contractor to verify prior to submittal. If different room designations and number system is used by Owner/contractor, these shall be used.
2. Size of equipment tags shall be minimum 1"x3". Larger sizes shall be used, 1-1/2" x 4", for equipment requiring additional information.
3. Colors shall be to the extent practical and possible; match duct and pipe marker color.
4. For equipment not ducted or piped, provide same color as adjacent equipment. Engraved plastic equipment tags shall be manufactured by MSI.
5. Equipment location tags shall be used for equipment located above acoustical ceiling and shall be MSI Model 35550 or approved equal. Color coding shall be per Owner. Tags shall be 7/8" dia. with heads that can be written on with a marking pen.

### 3.03 VISIT TO SITE

1. Due to the nature of the work involved under this Contract, all bidders are required to thoroughly examine the site. Bidding contractors shall 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 this Contract.
2. If discrepancies are noted between requirements of Contract Documents and existing conditions, this Contractor shall so indicate to architect during bidding period and receive clarification before bidding. Failure to comply with this requirement will result in Architect's interpretation

## SECTION 15010 – GENERAL REQUIREMENTS.

during the construction period and architect's decision will be final and binding as the sole interpreter of the Contract requirements.

3. Extras will not be considered for any work relating to connections with existing systems or adaptability of new systems to existing conditions.

### 3.04 CLEANING

1. Upon completion of the work, this Contractor shall remove all excess material, debris, tools and equipment from the site, and leave the premises in a broom clean condition.
2. Flush out all piping systems with proper solvents to insure removal of all foreign materials. Clean equipment, piping and other surfaces soiled by the work. Remove debris and rubbish on a daily basis.
3. Disposal of all materials shall be this Contractor's responsibility. All solvents and other chemicals, and materials used, shall be disposed of in strict accordance with all applicable environmental codes.

### 3.05 START-UP AND ADJUSTMENTS

#### 1. Equipment Start-UP

- A. The equipment manufacturer shall provide all start-up. Start-up shall be provided by the equipment supplier for all equipment.

### 3.06 OPERATING AND MAINTENANCE INSTRUCTIONS

1. This Contractor and equipment manufacturer shall furnish qualified personnel to instruct the Owner's people in the operation of the system and must request from the Owner, in writing, a date for such instruction to begin. Contractor's personnel shall remain until such instruction is complete to Owner's satisfaction. This Contractor shall receive from Owner written verification that the Owner's personnel have been thoroughly instructed in the operation, maintenance, and all facets of the system operation.
2. This Contractor shall have manufacturers' representatives, as part of their start-up, provide instruction on equipment.
3. Manuals shall include all equipment, equipment parts lists, complete oiling, recommend spare parts, and complete coiling, cleaning and servicing data compiled in a clearly indexed and easily understood form. The contractor shall obtain this information from the equipment supplier and include in the O & M manuals. The data shall indicate the serial numbers of each piece of equipment and provide complete lists of replacement parts, motor parts, ratings and actual loads.
4. Provide list of any special emergency operating instructions and a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to the various parts of the system.
5. Certified log of air quantities at all air supply, return and exhaust openings by Owners' balancing contractor.

## SECTION 15010 – GENERAL REQUIREMENTS.

6. Provide list of all motor data, including standard and actual operating in service data.
7. Provide all manufacturer's equipment guarantees and warranties.
8. Provide a list of units, filter sizes, quantities and recommended changes. For each piece of equipment, locate filter and demonstrate filter change.

### 3.07 TRAINING AND INSTRUCTION

1. Provide operating instructions shall include wiring and control diagrams showing complete lay out of each system. These instruction periods shall be a minimum of: General System – Eight (8) Hours

### 3.08 PAINTING AND FINISHING

1. All painting is to be done in accordance to Rust-Oleum Corporations printed instructions. All surfaces to receive two (2) coats of primer, exposed surfaces one (1) finished coat, color selected. Aluminum or galvanized metal surfaces are considered finished where concealed.
2. All surfaces to be carefully cleaned and/or pickled and filled as required to provide a proper uniform surface. Factory finished equipment shall be touched up or refinished where required.
3. Where equipment is provided as factory painted and is visible on roofs from grade (as determined by construction manager), exposed in space or otherwise not concealed behind finished surfaces, equipment shall be factory painted in accordance with manufacturers standard painting procedures. The color shall be selected by architect and a color chart shall be submitted for review.
4. All duct exposed and all other exposed equipment, pipe and appurtenances in all other areas unless specifically indicated to be painted by general contractor, to be painted by this Contractor color as selected. Submit for approval. All surfaces shall be prepared for painting and/or constructed of materials suitable to be painted.

### 3.09 CONSTRUCTION SAFETY

1. All work shall be done in accordance with the following Federal regulations:
  - A. Williams-Steiger Occupational Safety and Health Standards, Chapter XVII of Title 29, Codes of Federal Regulations.
2. Comply with local Health and Safety Regulations.

### 3.10 ENERGY CONSERVATION CODES

1. It is the intent of this specification that all equipment and materials furnished meet the latest enforced edition of the ASHRAE 90.1-2009 or such code as locally applicable, if more restrictive.



SECTION 15010 – GENERAL REQUIREMENTS.

3.11 EQUIPMENT LIST

Refer to general conditions. Exclusion of items on list does not relieve Contractor of the responsibility of providing equipment as specified, required to complete work or shown on drawings to be provided by this Contractor.

<u>EQUIPMENT</u>	<u>MANUFACTURERS</u>			
	<u>NUMBER 1</u>	<u>NUMBER 2</u>	<u>NUMBER 3</u>	<u>NUMBER 4</u>
Vibration Isolation	Mason Industries	Vibration Mountings		Or Approved Equal
Insulation	Owens Corning	John Manville	Knauf	Or Approved Equal
Exhaust Fans	Cook	Pennvent		Or Approved Equal
Air Devices	Metal Aire	Tuttle Bailey	Anemostat	Or Approved Equal
Valves	Mueller	Stockham	Nebco	Or Approved Equal
Hot Water Unit Heaters	Sterling	Modine	Rittling	Or Approved Equal
Gas Unit Heaters	Sterling	Reznor		Or Approved Equal

3.12 SCHEDULE OF WORK AND COMPLETION DATES

1. The exact times and dates and schedules that the projects will be available for this Contractor to do work, shall be as indicated in General Conditions. Refer to general conditions for completion dates.

3.13 DELIVERY AND STORAGE OF EQUIPMENT

1. This Contractor shall store, take deliveries and install all equipment in accordance with manufacturers' requirements (see "General Conditions").

3.14 PROTECTION OF SERVICES DURING CONSTRUCTION AND DEMOLITION

1. This Contractor shall repair, replace, and maintain in service any utilities, facilities or services (in existing areas where new work and/or demolition is to occur) which are damaged, broken, or otherwise rendered inoperative during the course of demolition and/or construction.
2. This Contractor shall effectively protect, at his own expense, his work, materials and/or equipment which may cause injury to building personnel during the construction period. All openings must be securely covered, or otherwise protected.
3. This Contractor shall be held responsible for all damage so done until his work is fully completed and finally accepted.
4. It shall be the responsibility of this Contractor to protect all existing construction and new motors, HVAC equipment, pumps, electrical equipment, plumbing fixtures and all construction during all phases of construction.

3.15 CONTINUITY OF SERVICES - EXISTING BUILDING

1. The work under the contract shall not interrupt services to the existing building or building systems or daily normal operation, except if all the following conditions are met.

## SECTION 15010 – GENERAL REQUIREMENTS.

- A. Building personnel are notified in advance and approve date and time in writing.
  - B. Interruption of service does not exceed one (1) hour unless otherwise approved.
  - C. Interruption of service does not occur during normal working hours.
2. No "extra" compensation will be permitted due to the "overtime" hours implicit in the requirements of this Section.
  3. Where interruptions will affect life safety and/or other critical systems, proper precautions shall be taken to maintain level of protection and/or system operation.
  4. This Contractor is cautioned that the existing building is to remain occupied during construction and that all services to the building are to be maintained. There shall be no interruption of services and, if absolutely necessary, at least seven (7) days prior notice is required.
  5. Any interruption of life safety systems (fire alarm sprinkler) the fire department and alarm company shall be notified, and proper precautions taken.
  6. There shall be no obstructing the exit ways from existing building.
  7. All interruptions of service shall be done at times which cause least disruption of service.

### 3.16 CONSTRUCTION SEQUENCING

1. Refer to General Conditions for the overall contract staging. However, specific items for HVAC contractor should be noted. The following are suggested methods of staging of construction. Alternate methods to achieve the intent of these specifications will be allowed; however, they must be coordinated with other trades and submitted for review and approval.
2. The sequence of construction shall be as indicated in the General Conditions of the specifications.
3. Where work is shown on mechanical plans where it is outside the phase areas indicated or specified in the General Conditions, this work shall be done at any time. All work shall be done so not to interfere with normal school operations. Where work is done outside normal school occupied areas (boiler room, roof area), this work may proceed at contractor's option. All work, regardless of the location of work, type of work, or extent of work, shall be done with the approval of the School District.
4. Where work in a particular phase requires work to be done outside that phases' construction boundaries, this Contractor shall locate all new duct, pipe, and equipment to allow for new construction and/or to integrate with existing building construction.
5. Where ductwork is to be installed in an unconditioned space (due to space not being constructed when duct, pipe, etc., is required to be installed), the pipe and/or duct shall be insulated as specified for outdoors. Where new pipe is required to be installed in an unconditioned space or space which shall be exposed to freezing, the pipe shall be insulated as specified for outdoors and heat traced to prevent freezing (power wiring by this Contractor).
6. All new ductwork and piping shall be installed and coordinated with proposed new work.

## SECTION 15010 – GENERAL REQUIREMENTS.

7. All work required to be modified due to non-compliance with this section, General Conditions or Construction Sequencing, shall be removed, replaced and/or modified at no additional cost to Owner.
8. The permanent ATC system shall be operational for any new construction, regardless of phase. Existing and/or new DDC systems and all wiring shall be installed and protected during construction to facilitate phasing. The use of modular control panels (LSIS, SAC's, etc.) will be allowed as long as the system functions can be monitored and controlled from that location for that phase and be connected to main system upon completion of work. Owner to be instructed on operation (not part of instruction period).
9. Where pipe is shown to serve future phases, provide capped outlet suitable for connection when phase is completed. Provide valves for isolation and draining lines without affecting the work installed in earlier phase.
10. The boiler operation and control sequence shall be modified (temporarily) to provide reduced flow and pressure and allow for boiler to be used for Area B.
11. All work associated with compliance of this section shall be the responsibility of this Contractor.
12. Contractor shall provide, prior to doing any work, schedule and provide procedure for accomplishing the work.

### 3.17 RELOCATION OF EXISTING EQUIPMENT

1. This Contractor shall be responsible for removal, storage, relocation and installation of all existing equipment shown or scheduled to be relocated or as may be required to remove existing equipment and/or install new equipment. This Contractor will be responsible for capping and reconnection of all existing services presently feeding existing equipment which must be relocated and/or modified and shall patch all adjacent surfaces to match existing.

### 3.18 CUTTING AND PATCHING

1. Unless otherwise specified and/or shown on architectural, HVAC and/or structural plans and specifications, to be done by general contractor, this Contractor shall cut and patch walls, floors, ceilings, roof surfaces and all existing construction for the removal of existing equipment, fixture, piping, controls and other construction for the completion of work under this Contract. All equipment, piping, ductwork, furniture and all construction or materials that are disturbed during construction shall be stored and protected from damage until replaced.
2. Cutting shall be done only after shop drawings have been prepared and with the Architect's approval. This Contractor shall exercise proper care and shall not endanger the structure by indiscriminate cutting and shall be responsible for and shall protect all existing construction to remain from damage. Provide and maintain all necessary temporary protective materials, coverings and barricades.
3. This Contractor may hire the other prime contractors to perform this work or hire a pre-qualified, independent contractor. This Contractor shall be familiar with and assume all responsibility for any conflicts with union policy and provide supervision in such a manner as not to impede the progress of other trades and be responsible for the adequacy and accuracy of same.

## SECTION 15010 – GENERAL REQUIREMENTS.

4. Wherever previously unfinished areas are exposed by the removal of existing equipment, these areas shall receive new finishes to blend into the adjoining work.
5. Wherever existing chases must be enlarged to encase new work, they shall be enlarged to match the existing construction
6. Wherever fire rated material must be patched, it shall be patched in a manner not to affect its fire rating.
7. All patching work must be done by skilled mechanics in a manner to minimize the patch effect. Wherever new painting is required, it shall be done with at least two coats over new materials.
8. The painting must not only cover the area of the actual patch, but also to the nearest natural break of the newly painted surface. Wherever the surrounding surface to be painted is in poor condition, all loose paint shall be removed before new paint is applied.
9. Patching of existing floor must be done in a manner to assure smooth undersurface and all joints must line up with existing.
10. Wherever new vinyl or rubber bases are to be supplied, they shall match adjoining bases in height and color.
11. Whenever existing ceilings are disturbed, they shall be replaced with new ceiling tiles or patched to match existing and all services, lights, fixtures, etc. supported temporarily and permanently reinstalled.
12. This Contractor shall remove and replace all ceilings required for his work with the exception of ceilings shown to be removed by general contractor on architectural plans.

### 3.19 REMOVAL

1. This Contractor shall remove existing systems as indicated on drawings.
2. All equipment, cabinets, ductwork, pipe controls, all pipe insulation (except any asbestos insulation), hangers, electric wiring and all construction and appurtenances shall be removed, to complete all work under this Contract. All work by this Contractor.
3. Equipment identified by Owner, prior to removal, that is to be retained by the Owner, which is not to be re-installed, and is to remain the property of the Owner shall be removed undamaged and stored in the building. Location shall be determined by the construction manager at no additional cost to Owner. This Contractor shall then load, transport and unload equipment from building to a site designated by Owner within 20-mile radius of site.
4. Removed ductwork, registers, equipment, automatic controls, pneumatic tubing, piping, pipe insulation and electric wiring and all debris shall be removed from the building and site in accordance with general conditions and shall be disposed of in accordance with all applicable environmental rules and regulations. Failure to properly dispose of materials in a proper manner that result in fines, penalties or additional cost are the responsibility of this Contractor.
5. All debris in areas occupied by the building personnel during periods of building operation shall be removed daily.

## SECTION 15010 – GENERAL REQUIREMENTS.

6. This Contractor shall patch all wall, floors and ceilings and roof surfaces to match existing adjacent surfaces where obsolete equipment, piping, ductwork, controls and wiring are removed.
7. Work shown on drawings may not indicate all equipment, pipe, etc., nor exact routes, sizes, locations, etc. The drawings are not to be used for estimating detailed take-off for amount of work required, drawings are for reference only. This Contractor shall visit site to determine extent of work and all conditions.
8. Where existing louvers are shown to be removed, the HVAC contractor shall remove and provide temporary closure and general contractor to provide permanent construction unless otherwise specifically indicated.

### 3.20 BUILDING ALTERATION WORK

1. This Contractor shall furnish all labor, equipment and materials required to complete alteration work in the building. Unless otherwise indicated on architectural drawings, this Contractor shall remove existing construction and replace, to remove existing equipment and/or install new equipment in conjunction with the work.
2. Cut, patch and paint walls, floors, ceilings, roof surfaces and all construction for the installation of equipment, piping and controls.
3. Cut and patch exterior walls for the installation of curb or openings thru wall. Finish to match existing adjacent surfaces.
4. Where existing electrical HVAC or plumbing work, due to removal of existing and/or installation of new equipment, is required to be removed. This Contractor shall disconnect existing equipment, cap services in a safe manner, remove equipment, store in a location to prevent damage, replace equipment, patch construction to match existing conditions and reconnect equipment to existing services.
5. This Contractor shall either retain qualified independent contractors or utilize the other on-site contractors. This Contractor shall assume all requirements for any conflicts with union policy and be responsible for same. This Contractor shall furnish necessary shop drawings and supervision, in such a manner as not to impede the progress of other trades and be responsible for the adequacy and accuracy of same.

END OF SECTION  
15010.6140



## SECTION 15110 - BASIC MATERIALS AND METHODS

### PART 1 GENERAL

#### 1.01 MATERIALS AND EQUIPMENT

1. All material and equipment used for this contract shall be unused and of the latest model or design available. Equipment shall be installed in strict accordance with manufacturer's recommendations and details.
2. Materials not specifically described but indicated or incidentally required shall be acceptable to the Architect and/or Engineer. Submit shop drawings. Materials shall be delivered, stored and handled so as to preclude injury by weather, dirt or abrasion.
3. This Contractor shall use only specifically assigned areas for storage of materials and construction operation, unless other areas are authorized by the Owner. Such areas will be identified after the award of Contract by Owner. Comply with local municipal regulations regarding use of and parking on public streets.
4. This Contractor shall repair streets, drives, curbs, sidewalks and any existing surface where disturbed by construction operations and leave them in as good condition after completion of the work as before operations started.

#### 1.02 PROTECTION

1. No pipe shall be left open any longer than is required to affix the next piece. If pipe ends are to be left for an extended period, they shall be closed with approved plugs or caps.
2. All equipment shall be covered to protect it from damage; all damage is the responsibility of this Contractor.
3. Any pipe, equipment or construction in existing building shall be done in such a manner to prevent injury to building personnel. Particular care must be taken for any work which will be done during building's normal operation.

#### 1.03 PRESSURE RATINGS

1. All equipment and materials shall have a working pressure as determined by A.S.M.E. (or similar body), of not less than 125 P.S.I.

#### 1.04 SLEEVES

1. All pipes passing through construction shall be fitted with flush sleeves of sufficient diameter to pass the insulation. Sleeves shall be 20 USG galvanized iron, except in masonry, where steel pipe sleeves shall be used. Sleeves in waterproof construction shall be steel pipe, waterproofed with modular mechanical synthetic rubber seals equal to "Link Seals" (Thunderline or approved equal). In floors, they shall extend an inch above the floor.
2. In fire divisions, sleeves shall be constructed of fire-retardant material and shall be installed to maintain the fire integrity of the fire division.

## SECTION 15110 - BASIC MATERIALS AND METHODS

3. All materials and construction methods shall be installed in accordance with the manufacturer recommendations and the requirements of the IBC Code or any other applicable code.

### PART 2 PRODUCTS

#### 2.01 PIPE

1. Steel pipe shall be Schedule 40; electric welded, ASTM-A53, Grade A, plain or galvanized as specified under applicable system.
2. Copper tubing shall be hard temper "Type L" except that all piping underground shall be "Type K", conforming to ASTM-B-88.

#### 2.02 PIPE FITTINGS

1. All welded fittings shall be of the same thickness and material as the pipe meeting ASTM-A234. Branch connections shall be made with Weldolets or welding fittings.
2. All flanges shall conform to A.S.A. B-16 using gaskets suitable for the service.
3. Cast iron screwed fittings shall be 125 psi cast iron, ASTM-A-126.
4. Malleable iron fittings shall be 150 psi WSP conforming to ASTM-A-338.
5. Fittings for copper tubing shall be wrought copper of the Solder Type conforming to A.S.A. B16.22.

#### 2.03 GATE, GLOBE AND CHECK VALVES

1. All valves 2" or smaller shall be ball valves and shall be bronze solder end valves in copper tubing and screwed end in other lines. Globe and swing check valves shall be of similar construction with renewable composition disc. Underground AWWA standard iron body, double disc., gate valves shall be used.
2. All valves used for throttling shall be globe type with 500 Brinnel full plug and removable seat.

#### 2.04 UNIONS

1. Unions shall be installed for the removal of equipment.
2. Unions 2" and smaller in copper tubing shall be all brass, ground joint, solder end. In other lines, screw end, malleable iron, 125 psi WSP, 300 psi WOG of the ground type.

#### 2.05 STRAINERS

1. Strainers to be self-cleaning ("Y" type), cast iron body installed ahead of all control valves and pumps; screens to be Monel or stainless steel with proper perforations for the service, ends to be screwed to 2" size, flanged for sizes 2½" and larger.



## SECTION 15110 - BASIC MATERIALS AND METHODS

### 2.06 ESCUTCHEON PLATES

1. Where any pipe passes into a finished space, there shall be provided a solid brass, chrome plated, escutcheon plate held to the pipe mechanically or fastened to the building construction.

### 2.07 ANCHORS

1. Anchors of approved design shall be provided where shown or required for the property control of the stress due to expansion. Anchors shall be heavy metal sections securely fastened to the building construction.

### 2.08 ANCHOR BOLTS

1. This Contractor shall furnish and install anchor bolts as required for the equipment. Anchor bolts shall be DECO's standard anchor with floating nut, adjustable 1/2" in any direction. Grout all bases.

### 2.09 ACCESS PANELS

1. Furnish and install access panels not smaller than 18"x18", for access to all concealed valves, automatic dampers, equipment, accessories, etc.
2. Access panels shall be all steel construction with a 16-gauge wall or ceiling frame and a No. 16 gauge wall or ceiling frame and a 14-gauge panel door with not less than 1/8" insulation secured to inside of door.
3. Doors shall have concealed hinges and cylinder lock except doors for wall panels may be secured with suitable clips and countersunk screws.
4. Access panels shall be flush with finished wall or ceiling and shall be painted to match adjacent surfaces. Access panels behind finished surfaces shall have color coded marking on finished surface to indicate location of doors and type of equipment.
5. Access panels in fire rated construction shall be fire rated.

### 2.10 CONDENSATE REMOVAL

1. All condensate pipe shall be copper and installed at a minimum of 3/4" dia. and a constant slope and uniform alignment. All condensate pipe shall be insulated.
2. All connections to units shall have traps and trap depth equal to operating static pressure of unit (i.e. unit with 2" static pressure, minimum depth of water in trap 2").
3. All condensate connections to units less than 15 tons shall be EZ Trap Series 100 cleanable condensate trap kits, or approved equal, consisting of 3/4" dia. trap inlet cross and outlet tee with closure cap. Provide for each five (5) traps installed, one (1) brush (minimum 2 brushes).
4. Condensate pipe shall discharge to leaching wells or as indicated on plans per local codes and/or site conditions.

## SECTION 15110 - BASIC MATERIALS AND METHODS

5. All condensate pipe from rooftop units shall not dump on roof but shall extend to closest roof drain and/or gutter. Where roof drain and/or gutter is greater than 50' from unit discharge, condensate shall discharge to roof with splash block. Splash block to be located where roof pooling, due to drain location, will not occur. Condensate discharging to roof shall be piped to a location where it will drain away from unit or low points on roof.

### 2.11 LINTELS

1. The general contractor will furnish and install all lintels required for the installation and completion of all work of this Contractor, provided that the general contractor is advised in advance of such requirements.
2. Failure to give proper notice and/or to comply with the above, requires this Contractor involved to be financially liable for all work and material necessary for the completion of work to install lintels. Submit shop drawings of all openings requiring lintels to general contractor.

### 2.12 ACCESS PANELS

1. Furnish and install access panels not smaller than 18"x18", for access to all concealed valves, automatic dampers, equipment, accessories, etc.
2. Access panels shall be all steel construction with a 16-gauge wall or ceiling frame and a 16-gauge wall or ceiling frame and a 14-gauge panel door with not less than 1/8" insulation secured to inside of door.
3. Doors shall have concealed hinges and cylinder lock except doors for wall panels may be secured with suitable clips and countersunk screws.
4. Access panels shall be flush with finished wall or ceiling and shall be painted to match adjacent surfaces. Access panels behind finished surfaces shall have color coded marking on finished surface to indicate location of doors and type of equipment.
5. Access panels in fire rated construction shall be fire rated.

### 2.13 HANGERS

1. All piping shall be supported by hangers, concrete inserts, and insulation saddles conforming to MSS-SP-58.
2. Hangers for steel pipe and copper tube shall be spaced not over 8' or as required by applicable code.
3. Vertical runs of pipe shall be supported by riser clamps except that pipe 1 1/4" and smaller may be braced by galvanized malleable iron fasteners. A hanger shall be placed no further than 24" from each change in direction of piping.
4. Hangers for copper tubing shall be copper plated, and completely encircle the tubing. Hangers for insulated pipe shall be outside insulation with sheet metal between insulation and hanger.

## SECTION 15110 - BASIC MATERIALS AND METHODS

5. Hangers shall not be connected to or supported from other pipe, conduits or any other equipment, and shall only be supported directly from building structure.
6. All hangers shall be installed in strict accordance with manufacturers' requirements and good industry standards.
7. Where existing construction is disturbed, removed and/or modified to install new hangers, the existing construction disturbed shall be repaired and/or replaced and finished to match adjacent surfaces.
8. Provide saddles under all pipe, see Section 15180 for specifications. All saddles on exposed pipe shall be painted.
9. Where hangers, support pipe or equipment is exposed in finished spaces, any penetrations of finished surfaces by hanger or supports shall have escutcheons or device to cover opening. All hangers in finished areas shall be painted and done in a neat workmanlike manner. Where hangers or supports may cause injury or are below 8'-0", provide color coded foamed glass finished padding minimum 1½" thick. Padding to be installed so that there are no rough exposed edges. All padding to be installed with fastening devices; no tape allowed.
10. Provide Unistrut or approved equal for mounting of pipe where building structural elements are not adequate.

### PART 3 EXECUTION

#### 3.01 JOINING PIPE

1. Steel piping shall be of welded or flanged construction in sizes 2½" and larger; screwed or welded construction in sizes 2" and smaller. All screwed fittings to be cast iron unless otherwise specified. All threads shall be conformity with A.S.A. B-21.
2. All screwed pipe joints shall be made with Teflon Dry Thread Sealer (3M-#48) or approved equal; applied to male threads only.

#### 3.02 JOINING DISSIMILAR METALS

1. Where copper is jointed to steel, joints shall be made by means of brass or bronze adapter in a cast iron fitting or by means of an electrochemically insulated union. Hangers supporting copper tubing shall be copper or copperized. Copper tubing lines shall not be, even temporarily supported or secured to ferrous metals.

#### 3.03 FOUNDATIONS

1. Foundations shall be provided by this Contractor for all equipment mounted on concrete floors and shall be of concrete construction not less than 6" high unless otherwise shown. Details of all foundations shall be submitted for approval.
2. Foundations or footings for structural steel supports shall be carried to a point not less than 12" below the underside of the floor slab, except where rock is encountered at less depth, then

## SECTION 15110 - BASIC MATERIALS AND METHODS

foundation may set on the rock. All foundations shall be built to templates and reinforced as required by the load to be imposed upon them.

### 3.04 STRUCTURAL STEEL

1. This Contractor shall furnish and install all structural steel, supports, braces, hangers, etc., required for his contract unless shown as being furnished and/or supplied by others.
2. Structural steel shall conform to "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings", of the American Institute of Steel Construction, and where applicable, "Code for Welding Building Construction", of the American Welding Society.
3. All structural steel design for support of HVAC system shall be the responsibilities of this Contractor. The design shall be prepared by a Registered Professional Engineer licensed in the state where work is being performed, whose seal should be affixed to plans.

### 3.05 PLENUM AREAS

1. Any duct plenum area, ceiling or room plenum shall not contain any combustible material, and all wiring and/or piping shall be suitable and approved by local authorities for plenum installation.

### 3.06 EXCAVATION AND BACKFILL

1. This Contractor shall do all excavating and backfilling necessary and repair finished surfaces that are disturbed. This Contractor shall remove or distribute all earth remaining as directed, and/or provide required backfill. Excavate all substances encountered to the depths and sections shown on drawings.
2. Excavation for pipes, manholes, catch basins, drain inlets, and other accessories shall have 12" clearance on all sides. Areas adjacent to any excavation shall be graded to prevent water running in.
3. Excavation shall not be carried below the required level, and if so carried shall be backfilled with gravel or sand, and tamp to proper compaction.
4. After proper inspection and tests all excavation shall be backfilled with approved material, free from large stones, clumps or frozen earth, wood and other objectionable material. This Contractor shall haul away excess material or provide additional fill as required.
5. Backfill for pipes shall be placed evenly and carefully around and over the pipe in six inches minimum layers. Each layer shall be thoroughly and carefully rammed by hand until one-foot cover exists over the pipe. The remainder of the backfill shall then be placed, moistened and compacted to a density equivalent to that of adjacent original materials using mechanical tamping machines.
6. Backfill for shall be placed symmetrically on all sides in one-foot maximum layers and shall be compacted with mechanical or hand tampers to density equivalent to 90% of laboratory density in accordance with ASTM-D698 test.

## SECTION 15110 - BASIC MATERIALS AND METHODS

### 3.07 INSTALLATION OF PIPING

1. All fittings, offsets, etc., may not be shown. This Contractor shall determine their necessity by investigating conditions at the site. This Contractor shall use shop drawings for exact locations.
2. All piping above ground shall be run parallel with the lines of the building in the most direct manner, concealed in furred spaces where possible.
3. Pipes shall be cut accurately and placed without springing or forcing all burrs removed.
4. All water piping inside the building shall be properly graded to drain equipped with a ½" hose outlet and angle drain valves.
5. All changes in size of piping shall be made by reducing fittings; no bushing will be permitted unless approved.
6. This Contractor shall determine, with approval, where expansion joints, loops or anchors will be required due to space restrictions prohibiting proper runout flexibility.
7. Valves, air vents, balancing cocks, etc., shall be placed in accessible positions, and flush metal access doors, (18"x18" minimum size), with necessary lintels, etc., provided where they are concealed.
8. All piping shall be located to prevent freezing. Where pipe is located in areas subject to freezing, provide freeze protection and insulation.
9. This Contractor to coordinate all pipe runs with other contractors. Where coordination of this contractors' work requires a modification of his equipment, layout, pipe runs, offsets in pipe, or additional pipe from what is diagrammatically shown on contractor documents, this shall be done at no additional cost to owner.
10. For all insulated pipe exposed in Gym, Locker Rooms and any exposed pipe below 8' +/- AFF in all other locations where pipe damage can occur, shall be provided with painted sheet metal jacket 22-gauge with concealed fasteners.

END OF SECTION  
15110.6140



## SECTION 15180 - INSULATION

### PART 1 GENERAL

#### 1.01 SCOPE

1. All surfaces throughout the work shall be insulated with fiberglass insulation as indicated in applicable section.
2. Removal and replacement of existing insulation for new work.
3. All insulation thickness and R Value shall be installed in accordance with ASRAE 90.1, latest edition.

### PART 2 PRODUCTS

#### 2.01 PIPE INSULATION

1. All piping throughout the work shall be insulated with fiberglass pipe insulation in thickness, indicated in Part 3.04, of high density and with jacket indicated in the applicable section with the exception that outside, or areas exposed to freezing; thickness shall be doubled.
2. All pipe shall be insulated in such a manner as to prevent condensation on all pipe surfaces and appurtenances. All pipe insulation to be tightly butted and sealed to prevent condensation.
3. Vapor barrier jackets shall have self-sealing lap joint, and joints between sections shall be covered with a 4" wide strip to self-sealing vapor barrier materials. Aluminum bands shall be applied, two to a section on all indoor insulation.
4. On outdoor installations, provide double insulation thickness with 20-gauge stainless steel jacket, stainless steel banded or stainless-steel screws. Note: All hot water heating pipe to be heat traced.
5. All pipe exposed in finished areas shall be painted color selected. All other pipe exposed in any finished area. Where pipe is located below 8'- 6" AFF and all pipe exposed in Shops, Locker Rooms, Gym and Cafeteria and any other location; insulation shall have stainless steel jacket same as indicated for outdoor pipe, except with no exposed joints or seams.
6. All Refrigerant piping (except hot gas) throughout the work shall be insulated with a 1/2" (nominal wall thicknesses) mold resistant flexible elastomeric, thermal insulation, Insulation must be acceptable for use in air plenums and conform to NFPA 90A and NFPA 90B requirements and meet or exceed ASTM C 534, Type I - Tubular Grade I Standard.
7. All pipe insulation located inside of building shall be plenum rated.

#### 2.02 DUCT INSULATION

1. All supply ducts in unconditioned spaces, in return ceiling return plenums and all outside air ductwork; shall be insulated with high density fiberglass rigid insulation, UL labeled faced with aluminum foil covered, glass reinforced, flameproof, kraft paper.

## SECTION 15180 - INSULATION

- A. Duct insulation R Values shall be in accordance with 2015 International Energy Conservation Code, Section C403.2.9.

Unconditioned Space – R=6.0 per requirements indicated for the climate zone of the building.

Outside Building – R=8.0 per requirements indicated for the climate zone of the building.

2. All supply and return ductwork in Boiler Rooms and outside of building insulation envelope shall be insulated as above in 3" thickness.
3. Duct insulation and linings shall not glow, flame or smolder when tested at their rated temperatures in accordance with ASTM-C-411, test temperature 250° F. or greater.
4. Duct coverings shall not penetrate fire resistance rated enclosures nor partitions required to be fire rated. Duct insulation at rated enclosure shall have insulating material in accordance with applicable code.
5. Duct supports shall not penetrate duct insulation.

### PART 3 EXECUTION

#### 3.01 INSTALLATION OF PIPE INSULATION

1. All pipe insulation shall be applied over dry, clean surface with joints tightly butted and jacket firmly and securely attached and smoothed. Insulation shall be continuous through wall, floor or ceiling openings and sleeves.
2. All valve bodies and fittings shall be insulated with preformed fittings of thickness equivalent to adjacent insulation and jacketed with same material. At Contractor's option, except in plenums, outdoors and where not permitted by code; provide precut fiberglass insulation blanket of same insulation thickness as adjacent insulation with a preformed snap on type molded PVC jacket, cover edges with vapor barrier adhesive or vapor barrier tape.
3. Provide metal shields under all hangers or pipe supports on outside of insulation; on roller supports provide pipe shoe cavity with insulation. Insulation inserts shall be heavy duty insulation material length 12" up to 6" dia. pipe 16" long on 8" & 10" pipe & 22" long on 12" pipe and larger. Where insulation cannot support pipe, provide Kaylo or approved equal insulation. Provide vapor barrier. **HANGERS SHALL NOT PENETRATE PIPE INSULATION.** Paint shields on exposed pipe same color as pipe. If pipe is not painted and insulated, paint same color as insulation (white).
4. On outdoor insulation, double insulation thickness, provide stainless steel jacket, and removable stainless-steel jacket at fittings and valves.
5. All pipe connections to equipment shall include all insulation to cover openings to unit unless manufacturer provides method of closure.
6. All pipe insulation to be installed in accordance with insulation manufacturers' requirement to provide moisture tight and thermal performance per specifications and manufacturer's requirements.



## SECTION 15180 - INSULATION

7. Pipe feeding radiation in enclosures, no insulation is required.
8. All pipe insulation to be continuous with no breaks in vapor barrier. All pipe supports shall have sheet metal shields.
9. All outdoor refrigerant pipe from thru wall penetration to condensing unit shall be enclosed. Enclosure shall be Mitsubishi Line Hide or approved equal. Provide all covers, elbows, supports and appurtenances to allow for full protection of refrigerant pipes outdoors. Exact size to be determined in field. Where multiple line sets are indicated on wall, they may be run in one enclosure. All work to be done in accordance with manufacturer requirements.

### 3.02 INSTALLATION OF DUCT INSULATION

1. Insulation shall be pasted to the duct using "3M" EC-321 or approved equal with joints butted and taped with "Scotch No. 47A" or approved equal flame-resistant vinyl baked tape and dry dust free surface using nylon sealing tool. Tape to be used to seal joints only, NOT TO HOLD INSULATION TO DUCT.
2. In lieu of pasting insulation to duct it may be impaled on 12-gauge mechanical fasteners welded or glued on 12" to 18" centers with minimum of two (2) rows, per side-seal protruding pin with mastic and secure with metal cap.
3. Duct coverings shall not penetrate fire resistance rated enclosures nor partitions required to be fire rated.
4. Insulation shall fit between seams and stiffeners. All joints tightly butted.
5. All duct insulation shall be installed per manufactures' requirements.

### 3.03 EQUIPMENT INSULATION

1. All equipment containing fluids whose piping is specified to be insulated or whose surface temperatures will be low enough to cause condensation (60° F.), or high enough to burn persons touching same (110°F.), shall be insulated with a minimum of 1½" thick fiberglass block firmly butted and wired in place, and covered with ½" thick coat of insulating cement troweled over one-inch galvanized hexagonal wire mesh and cement troweled smooth. Metal corners beads shall be applied to protect corners.

### 3.04 INSULATION THICKNESS

1. Minimum pipe insulation thickness shall be in accordance with the International Energy Efficiency Code (Latest applicable edition), Table C403.2.1 or local requirements and the following table:

SECTION 15180 - INSULATION

Fluid Design Operating Temp. Range (°F.)	Insulation Conductivity		Nominal Pipe or Tube Size (in.)				
	Conductivity Btu·in./(h·ft <sup>2</sup> ·°F)	Mean Rating Temp. °F	<1	1¼ to <½	1½ to 4	4 to <8	≥8
141-200 Hot Water Heating	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
40-60 Chilled Water	0.21-0.27	75	1.0	1.5	2	1	1

- A. For hot water piping small than 1½” and located in partitions within conditioned spaces and/or in pipe enclosures, reduction of these thickness by 1” shall be permitted, but not to a thickness less than 1”.
  - B. For direct-buried heating and hot water system piping, reduction of these thicknesses by 1½” shall be permitted (before thickness adjustment required, but not to thicknesses less than 1”.
2. Where piping runs outdoors, double insulation thickness.
  3. Provide heat tape (electric) to prevent freezing of outdoor piping and new/existing outdoor condenser water pipe, domestic water pipe chemical treatment pipe and spray pump assembly and pipe, and all other piping subject to freezing. Electric heat tape to be Chromalox Type M1 cable or approved equal, furnished with all controls, power wiring and appurtenances. Size and capacity per manufacturers’ requirements. Provide interface to DDC system for alarm conditions.

END OF SECTION  
15180.6140

## SECTION 15190 - TESTING AND BALANCING

### PART I GENERAL

#### 1.01 SCOPE

1. Provide all labor, materials and miscellaneous items as required to perform all the testing and balancing of ALL air and water system devices and/or systems indicated on plans and/or in the specifications as the mechanical contractor's scope of work.
2. Provide all labor, materials and miscellaneous items as required to perform the testing and balancing of ANY air and water system devices and/or system indicated on plans and/or in the specifications to be provided by TAB contractor.
3. The TAB contractor is to furnish and install all sheaves and pulleys for new HVAC equipment where indicated on plans and/or in the specifications.
4. The TAB contractor shall rebalance 10% of the air and water devices and/or systems after the final balancing report is completed and reviewed by the mechanical engineer. The rebalancing scope shall be as directed by the mechanical engineer's review comments of the final balancing report.

#### 1.02 APPROVALS

1. All work to be done in accordance with the following:
  - A. American National Standards Institute (ANSI): Specification for Sound Level Meters
  - B. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE): ASHRAE Handbook of Fundamentals latest edition.
  - C. Associated Air Balance Council (AABC): 2002 AABC National Standard for Total System Balance
  - D. National Environmental Balancing Bureau (NEBB): 1998 Procedural Standards for Testing-Balancing Adjusting of Environmental System; 2nd Edition.

#### 1.03 TESTING AND BALANCING

1. Upon completion of the installation and field testing, performance test and adjust all air, water, and/or steam system to provide the air volume and water flow quantities indicated and sound levels required. Accomplish all work in accordance with the agenda and procedures specified by AABC and standards of the NEBB. Correct air and water system performance deficiencies disclosed by the test before balancing the systems.

#### 1.04 AGENCY QUALIFICATIONS

1. This Contractor shall obtain the services of a qualified testing organization to perform the testing and balancing work. Prior to commencing work the testing organization shall have been approved by the Architect/Engineer.

## SECTION 15190 - TESTING AND BALANCING

2. The criteria for determining qualifications shall be membership in the AABC, or certification by the NEBB, or the testing organization shall have submitted proof to satisfy the Architect/Engineer that the organization meets the technical standards for membership of the AABC.

### 1.05 AGENDA

1. Review plans and specifications prior to installation of any of the affected system. Submit a written report to the architect indicating any deficiencies in the system.
2. An agenda shall be submitted and approved by the architect prior to start of testing and balancing work. Include the following:
  - A. General description of each system with its associated equipment, and operation cycles.
  - B. A complete listing of all flow and air terminal measurements to be performed.
  - C. Proposed selection points for sound measurements.
  - D. Specific test procedures and parameters for determining specified quantities, e.g. flow drafts, sound levels, etc.
  - E. Samples of forms showing applications of procedures and calculations.

### 1.06 PROCEDURES, GENERAL

1. Adjust systems and components thereof that perform as required by drawings and specifications.
2. Operating tests of heating and cooling coils, fans and other equipment shall be of not less than 4 hours duration after stabilized operating conditions have been established.
3. Method of application of instrumentation shall be in accordance with the approved agenda.
4. Instruments used for measurements shall be accurate. Calibrate each test instrument by an approved laboratory or by the manufacturer. The engineer has the right to request instrument recalibration, where accuracy of readings is questionable.
5. Comply with manufacturer's certified instructions.
6. Do not install permanently installed equipment for the tests, e.g. gauges, thermometers, etc., until just prior to the tests to avoid damage and changes in calibration.

### 1.07 BALANCE & BALANCE REPORT SCHEDULE

1. The HVAC contractor shall provide the balance report and submit to the Architect/Owner as a shop drawing, which shall be distributed and reviewed in accordance with the general conditions.

## SECTION 15190 - TESTING AND BALANCING

2. Any and all work required for balancing of the system shall be done prior to the HVAC contractor submission of Billing for Substantial Completion.
3. Balancing shall include initial and final balancing. All adjustments to the system to provide the required flows, pressure temperatures, etc., shall be completed. Where adjustments to the system are required to provide proper specified performance, this work shall be done at no additional cost to owner.
4. Where any modifications, adjustments, replacement of equipment, removal and replacement is required to provide proper system performance, this work shall be done by the HVAC contractor at no additional cost to owner.
5. Where any of the above required modifications, etc., results in the removal, replacement, repair, modification, and/or other work of other prime contractors or subcontractors, the cost of this additional work shall be the responsibility of the HVAC contractor and shall be completed at no additional cost to owner.
6. The final approved balance report shall be provided to the inspecting authority having jurisdiction prior to substantial completion and is a condition to receive the Certificate of Occupancy or Temporary Certificate of Occupancy.
7. It is the HVAC contractors' responsibility to have the system completed and ready for balancing to meet the specified performance, construction, and completion schedules per the General Conditions.
8. The requirements of this specification are applicable to all phased projects. For phasing, refer to General Conditions.

## PART 2 EXECUTION

### 2.01 AIR SYSTEMS GENERAL REQUIREMENTS

1. All systems shall be balanced to provide air flow rates measured and adjusted to within 7.5% of the design rates. Provide a typed or computer-generated balance report using standard AABC forms and industry accepted practices for presentation. Where conditions do not allow for system to achieve the specified values, is to be clearly indicated prior to submission of balance report as a separate professionally prepared industry standard form.
2. Review of Documents - It shall be the responsibility of this Contractor and balancing contractor to thoroughly review the design drawings prior to submission of shop drawings and indicate where there may be possible problems with accessibility to equipment to allow for proper balancing or where system design will not allow for proper balancing and provide written description of possible problems. The balancing contractor shall review pipe and sheet metal shop drawings and shall provide written confirmation that this has been done. Coordinate with this Contractor for locations of all volume control devices. Where volume control devices are required for proper balancing of the system, they shall be provided by this Contractor at no additional cost to owner.
3. Air systems shall be balanced in a manner which shall first minimize throttling losses, then fan speed shall be adjusted to meet design flow conditions.

## SECTION 15190 - TESTING AND BALANCING

4. Variable Air Volume Distribution Systems - Where the distribution system utilizes a variable speed or variable air design, all main duct between the fan and controlling devices does not have to be balanced, except where automatic dampers with an air quantity are shown, these shall be set for proper air flow at maximum design conditions. All outlets downstream of the control device (VAV box) shall be balanced.
5. After completion to tests, adjustments and balancing under minimum fresh air conditions, set the system for 100% fresh air. Repeat the total CFM tests as specified above to check field versus design conditions. The results under 100% fresh air cycle shall agree with conditions found under "minimum fresh air operation" before the system is considered to be in balance. Adjustments of the proper dampers shall be made to achieve balance.
6. This Contractor shall include as part of his bid, cost to rebalance system after initial and final adjustments based on field conditions, owners' request or problem areas. For purposes of the bid, the contractor shall assume a maximum of 10% of all air devices to be rebalanced, to include rebalancing of the fans associated with the air devices.
7. This Contractor shall be certified by N.E.B.B. or A.A.B.C.
8. This Contractor shall notify Owner or his representative in a timely manner prior to balancing system so that if they elect, they may accompany balancing contractor.
9. The system shall be commissioned as specified and all balancing shall be done accordance with time schedule as specified above and in General Conditions.

### 2.02 AIR SYSTEM PROCEDURES

1. Adjust all air handling systems to provide the required design air quantity to, or through, each component.
2. Adjust equalizing devices to provide uniform velocity across the inlets.
3. Use flow adjusting (volume control) devices to balance air quantities only.
4. Balancing between runs (submains, branch mains, and branches): Use flow regulating devices at, or in, the divided - flow fitting.
5. Final Measurement of Air Quantity: Make final measurements of air quantity, after the air terminal has been adjusted to provide the optimum air patterns of diffusion.
6. Fan Adjustment: Total air system quantities, generally, shall be varied by adjustment of fan speeds.
7. Except as specifically indicated herein, make pitot tube traverses of each duct to measure air flow therein.
8. Pitot tube traverse may be omitted if the duct serves only a single room or space and its design volume is less than 2,000 cfm.

## SECTION 15190 - TESTING AND BALANCING

9. Where ducts' design velocity and air quantity are both less than 1000 (fpm/cfm), air quantity may be determined by measurements at terminals served.
10. Test holes shall be in a straight duct, as far as possible downstream from elbows, bends, take-offs, and other turbulence generating devices.
11. Air Terminal balancing: Measurement of flow rates by means of velocity meters applied to individual terminals shall be used only for balancing. Measurement of air quantities at each type of air terminal (inlet and outlet) shall be determined by the method approved for balancing agenda.
12. The volume dampers, splitters and deflectors shall be adjusted so that the air velocities and volume will be as specified.
13. A further balance shall be made on temperature basis to maintain uniformity throughout, if so directed.
14. With the fan supply set to handle normal minimum outdoor air, the balancing firm shall perform the following tests and compile the following information.
  - A. Air Handling Equipment
    1. Design Conditions
      - a. CFM Supply Air
      - b. Static Pressure
      - c. Motor HP
      - d. Code Required Outside air CFM
      - e. Outside air CFM
      - f. Fan RPM
    2. Installed Equipment
      - a. Manufacturer
      - b. Size/Model Number
      - c. Motor HP, Voltage, Phase, Full Load Amperes
    3. Field Test
      - a. Fan Speed
      - b. No Load Operating Amperes
      - c. Fan Motor Operating Amperes
      - d. Calculated BHP
    4. Test for Total Air
      - a. Size of discharge, return air, and outside air ducts.
      - b. Number and locations of velocity readings taken and Static Pressure readings taken.
      - c. Duct Average Velocity

## SECTION 15190 - TESTING AND BALANCING

- d. Total CFM
- e. Outside air CFM
- f. Return air CFM

### B. Individual Outlets (diffusers, registers and/or grilles):

1. Identify each outlet or inlet as to location area and fan system, outlet, manufacturer, and type, outlet size, free area, core area, or neck area, required FPM and test velocity and CFM and test results.

### 2.03 AIR DELIVERY AND NOISE

1. This Contractor shall guarantee that all equipment shall operate without objectionable noise or vibration; that all ductwork shall be free from pulsation or objectionable noises; that the volume of air specified will be delivered to all points of supply and exhaust.
2. After this system is in operation, should the ductwork be found to vibrate or chatter, this Contractor will be required to eliminate same.

### 2.04 AIR TIGHTNESS

1. All ductwork shall be airtight per SMACNA leakage standards. All transverse, joints longitudinal seams and duct wall penetrations shall be sealed in accordance with ASHRAE 90.1 1999 and have adhesive (3M EL-750). Pressure sensitive tape shall only be allowed for supply air duct with design pressures less than 2" W.C. in return air plenums.

### 2.05 AIR SYSTEM DATA

1. The certified report shall include typical unit ventilator 1<sup>st</sup> floor inside room - high speed, typical unit ventilator 2<sup>nd</sup> floor inside room - high speed and typical condensing unit operation – including all units in single cluster.

### 2.06 SOUND LEVEL DATA

1. The certified report shall record data on sound levels, taken at each selected location, as follows:
  - A. Source of sound and location.
  - B. Diagram or description of relationship of sound source to measuring instrument.
  - C. "A" Scale Readings
    - Equipment being tested turned off (ambient).
    - Equipment being tested turned on (operating conditions).
  - D. Reading at each specified octave band frequency
    - Equipment being tested turned off (ambient).
    - Equipment being tested turned on (operating conditions).



## SECTION 15190 - TESTING AND BALANCING

E. "Equipment components" of sound (noise) levels with applicable calculations per "Sound Test Procedure".

F. Graph showing relationship between pressure levels specified and recorded readings.

### 2.07 WATER SYSTEM PROCEDURES – ALTERNATE BID #1

1. Adjust heating, cooling, and condensing water systems to provide required quantity to, or through each component.

2. Measure water quantities and pressures with calibrate-meters.

3. Use venturi tubes, orifices, or other metering fittings and pressure gauges. Adjust systems to provide the approved pressure drops, prior to the capacity testing. Where flow metering fittings are not installed, measure temperature differential across the heat transfer equipment.

4. Position automatic control valves for full flow through the heat transfer equipment.

5. Pumps

A. Design Data

- GPM
- Head
- RPM
- BHP

B. Installed Equipment

- Manufacturer
- Size
- Type Drive
- Motor HP
- Volts
- Cycles
- Phase
- Full Load Amperes

C. Field Test

- Discharge pressure at full flow and no flow.
- Suction pressure at full flow and no flow.
- Operating head and GPM.

6. All heat transfer equipment heating and cooling elements and primary and secondary takeoffs.

A. Design Data

SECTION 15190 - TESTING AND BALANCING

- MBH specified
- GPM specified
- Entering Water Temperature (E.W.T.)
- Entering Air Temperature (E.A.T.)
- Water Temperature Drop (W.T.D.)
- Element type specified

7. Water quantities and capacity shall be measured by temperature taken.

END OF SECTION  
15190.6140

## SECTION 15615 - GAS FIRED UNIT HEATERS

### PART 1 GENERAL

#### 1.01 SCOPE

1. Furnish and install all gas fired unit heater equipment.
2. Leave equipment completely installed so that only the connection of auxiliary services is required to make ready for start up. Provide all materials, miscellaneous equipment and interconnecting piping required for the proper functioning of the work.

#### 1.02 APPROVALS

1. Equipment shall be approved by the A.G.A. and bear the A.G.A. label and be approved by the local utility (where applicable).

### PART 2 PRODUCTS

#### 2.01 HIGH EFFICIENCY GAS FURNACE

1. Gas-fired high efficiency furnaces shall be of size, capacity and arrangement as indicated on plans, have a AFUE of 97.3% and utilize a sealed combustion system suitable for 100% outdoor air for combustion.
2. Provide combustion air pipe and vent pipe of size, capacity and maximum length, and be installed as required by manufacturer. Provide factory authorized wall or roof termination kit. Where pipes extend thru wall, all exposed pipe to be painted color selected. Where combustion and/or ventilation pipe is located within plenums, these pipes shall be enclosed or insulated with approved materials.
3. Provide electronic spark ignition, inducer blower, primary and secondary heat exchangers, condensate trap, burner assembly, printed circuit board, filters and filter pack.
4. Blower motor shall be field adjustable and be capable of providing control, air flow and static pressure as required for cooling applications.
5. Provide 1 day/24-hour programmable room thermostat.
6. Unit shall be suitable for installation of future direct expansion coil. Supply fan shall be sized for the pressure drop of the coil. Balance fan for system pressure without coil.

#### 2.02 INDOOR, GRAVITY-VENTED GAS UNIT HEATERS

1. Provide, as indicated on plans, gas-fired, indoor, power-vented axial gas unit heaters designed for 82% thermal efficiency equipped for use with (natural) gas. The heat exchanger shall be the Titanium stabilized aluminum Thermocure design of E-3 (409) stainless steel with E-3 (409) stainless steel drip pan. Die-formed burners are constructed of E-3 (409) stainless steel and include flared ports and a stainless-steel insert.

## SECTION 15615 - GAS FIRED UNIT HEATERS

2. Unit shall have a 24-volt control transformer, single stage control, with a regulated combination redundant gas valve and an intermittent spark pilot with electronic flame supervision and timed lockout. The unit shall have all required limit and safety controls, including an energy cut-off (ECO) device on units with manual pilots and blocked bent shut-off system.
3. All gas-fired unit heaters must bear the A.G.A. label.
4. Units shall have propeller fan, open drip-proof motor, with internal overloads, and safety fan guard. Horizontal louvers shall be provided for directing air flow. The unit shall be arranged for ceiling suspension with threaded hanger connections and provided with hanger kits. The cabinet shall be constructed of zinc grip steel and finished with baked-on enamel.
5. Provide gas vent per manufacturer up thru sloped roof with cap. Terminate 3' above air rof within 10' radius.

### PART 3 EXECUTION

#### 3.01 VENTS

1. To be furnished under section titled "Duct Systems". Leave equipment so that only final vent connections are required to complete the installation. Provide all vents which shall be as specified in section titled "Duct Systems".

END OF SECTION  
15615.6140

## SECTION 15720 - WATER CIRCULATING SYSTEMS

### PART 1 GENERAL

#### 1.01 SCOPE

1. The work under this heading shall include the furnishing and installation of:
  - A. All piping including connections to all equipment and installation of all control devices required for the proper functioning of the work. All insulated valve, materials and specialties necessary for the proper functioning of work. Connections to all equipment requiring connections to this water circulating systems whether furnished under this section or not.
  - B. Connections to, modifications of, and/or removal of existing systems due to new work.

### PART 2 PRODUCTS

#### 2.01 PIPING MATERIALS

1. Hot Water Heating - Black Steel Pipe Schedule 40 or Copper Tube Type "L", Type "K" underground.

#### 2.02 PIPE INSULATION

1. Hot Water Heating - All Service Jacket.

#### 2.03 AIR CONTROL DEVICES

1. Furnish and install air control devices of type and size shown on drawings or as required for proper system operation.

#### 2.04 BALANCING FITTINGS

1. Furnish and install at the return end of each terminal device, fin tube circuit, unit heaters, coils, heat pumps, etc., a plug valve of same size as run-out.

#### 2.05 AIR VENTS

1. Furnish and install Maid of Mist Automatic air vent, #71 or #74 (150 psi) or approved equal on all unit heaters and all major drops in piping. Main air vents in equipment room to be Sarco #13W or approved equal. All air vents shall be installed in such a manner that they are readily accessible for servicing.

#### 2.06 INLET VALVES

1. Furnish and install at the inlet to each terminal device, finned tube circuit, etc., one (1) Lock Shield Gate Valve, same size as run-out.

## SECTION 15720 - WATER CIRCULATING SYSTEMS

### PART 3 EXECUTION

#### 3.01 SYSTEM BOIL OUT

1. All work shall be done under the instruction and supervision of a reputable local Water Treatment Contractor, which firm shall be submitted for approval.
2. Where new pipe is shown to be connected to existing pipe, the new pipe shall be cleaned and tested as specified below. All cleaning shall be done with valves at connection to existing system closed. Provide method to fill and drain system.
3. This Contractor shall be responsible for furnishing and installing additional chemicals due to increased amount of water in system due to new pipe and equipment.

#### 3.02 BALANCING

1. For balancing, see Section 15190.

#### 3.03 TESTS WATER PIPING

1. All piping shall be hydraulically tested for a period of four (4) hours to the following pressure or 1½ times working pressure; before insulation is installed, minimum 150 psi for chilled and hot water heating systems.
2. During the period of tests, all welds, joints, etc., shall be coated with a soap emulsion to test for leaks. Any leaks that are disclosed by the test shall be made tight and all joints left free of all imperfections. The four-hour tests period shall continue after any imperfections have been perfected. All piping in chases or concealed shall be tested before they are covered.

END OF SECTION  
15720.6140

## SECTION 15760 - TERMINAL UNITS

### PART 1 GENERAL

#### 1.01 SCOPE

1. Furnish and install all terminal units. Leave equipment completely installed so that only the connection of auxiliary services is required to make ready for start up. Provide all materials, miscellaneous equipment and interconnecting piping required for the proper functioning of the work.

#### 1.02 CERTIFICATION

1. All fans shall have AMCA Certified ratings. All radiation shall be IBR rated. All equipment, where applicable, shall bear UL label.

### PART 2 PRODUCTS

#### 2.01 UNIT HEATERS

1. Unit Heaters shall consist of fan, factory finished baked enamel casings, and non-ferrous metal coils with fins mechanically bonded to tubes. Fan motors to be totally enclosed, designed for continuous operation. Unpainted ferrous parts to be cadmium plated.
2. Horizontal unit heater shall be furnished with double deflection louvers. Vertical unit heaters shall be furnished with adjustable diffusers. Provide fan guards where blades would otherwise be exposed.
3. Cabinet unit heaters shall be furnished with multiple centrifugal fans and be recessed mounted unless otherwise approved.
4. Units to be of manufacturer types, capacities and quantity shown on drawings.
5. Interface with central control system where applicable. Provide electronic programmable wall mounted thermostat.

#### 2.02 CABINET UNIT HEATERS – ALTERNATE BID #1

1. Units shall be of manufacturer size, quantity and capacity as indicated on plans.
2. Cabinet type models shall have 16-gauge steel cabinets, except horizontal cabinet type which shall be of 18-gauge steel. Integral stamped inlet and outlet grilles shall have 15-degree downward deflection. Cabinets shall have heavy density glass fiber insulation and surfaces shall be phosphatized and painted with baked enamel; colors selected by Architect.
3. Vertical recessed and semi-recessed models shall have 16-gauge front panels attached directly to the basic unit.
4. All coils shall have aluminum plate-type fins mechanically bonded to the copper tubes suitable for working pressures up to 300 psig. Supply and return connections to be on same side of units.

## SECTION 15760 - TERMINAL UNITS

5. Fans shall be direct driven, forward curved, centrifugal double width type. Motors shall be the permanent split capacitor type and have three (3) speeds. Filters shall be the Scott Foam type.
6. Verify wall thickness in field prior to installation or ordering, adjust mounting.
7. Provide wall mounted remote thermostat and all interconnecting services. Provide interface with central control system where applicable.

### 2.03 RADIANT HOT WATER HEAT PANEL – ALTERNATE BID #1

1. Provide modular hot water heat panel complete with all hangers, materials, pipe and appurtenances.
2. Panels shall be constructed of 18-gauge extruded aluminum panel joint clips, zinc plated steel springs and panel suspension clips zinc plated.
3. Panels shall be nominal 48"x24" and have capacity per plans.
4. Provide copper tube 5/8" serpentine with 1" thick foil backed insulation (suitable for plenums).
5. Finish shall be white polyester powder coating.
6. Provide supply and return water connections.
7. Provide insulation per manufacturer above panel.

### PART 3 EXECUTION

1. Provide vibration isolation and all hanging materials required prior to hanging of any unit, verify supports.

END OF SECTION  
15760.6140



## SECTION 15810 - AIR HANDLING EQUIPMENT

### PART 1 GENERAL

#### 1.01 SCOPE

1. Furnish and install all fans and air handling units. Leave equipment completely installed so that only the connection of auxiliary services is required to make ready for startup. Provide all materials, miscellaneous equipment and interconnecting piping required for the proper function of the work.

#### 1.02 CERTIFICATION

1. All fans shall have AMCA Certified ratings for sound and performance and bear UL label and manufacturer be 150 9001 certified facility.

#### 1.03 ENERGY EFFICIENCY

1. All motors shall be premium high efficiency type.

#### 1.04 BALANCING

1. Balance all equipment per manufacturer requirements and Section 15190.

### PART 2 PRODUCTS

#### 2.01 ROOFTOP CENTRIFUGAL FAN

1. Rooftop centrifugal fan shall be a spun aluminum, roof mounted, belt-driven, downblast centrifugal exhaust ventilator.
  - A. Fan shall be manufactured at an ISO 9011 facility and be listed by UL: 705. Fan shall bear the AMCA Certified Ratings Seal for Sound and Air Performance.
  - B. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum shall be bolted to a rigid aluminum support structure. The aluminum base shall have continuously welded curb cap.
  - C. Top cap shall have stainless steel quick release latches to provide access into the motor compartment. An integral conduit chase shall be provided through the curb cap.
  - D. The motor, bearings and drives shall be mounted on a minimum 14-gauge steel power assembly, isolated from the unit structure with rubber vibration isolators, enclosed in a weather-tight compartment, separated from the exhaust air stream.
  - E. Lifting lugs shall be provided. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM, static [pressure and maximum fan RPM. Unit shall be shipped in ISTA Certified Transit Tested Packaging.
  - F. Wheel shall be centrifugal backward include, constructed of 100% aluminum with aerodynamic aluminum inlet cone. Wheel shall be balanced in accordance with AMCA Standard 204-96.

## SECTION 15810 - AIR HANDLING EQUIPMENT

- G. Motor shall be premium efficiency heavy-duty type with permanently lubricated sealed ball bearings.
- H. Bearings shall be for use in air handling applications. Construction shall be heavy-duty re-greaseable ball type in a cast iron pillowblock housing selected for a minimum L50 life in excess of 200,000 hours. Belts shall be oil and heat resistant, non-static type.
- I. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150% of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM. Fan shall have disconnect switch, backdraft damper, birdscreen, galvanized sound self-flashing curb.
- J. Paint fan color selected. Provide name tag.

### 2.02 FANS

- 1. All fans to be manufacturer type, size, quantity and capacity shown on drawings. All rooftop fans shall have self-flashing Unibeam roof curbs and disconnect switch. All fan motors shall be premium high efficiency. All fans shall have backdraft damper.
- 2. Ceiling exhaust fans shall have acoustically insulated housings, maximum sound level rating of 4.6. AMCA Sones terminal box with cord, plug and receptacle inside the housing. Entire fan, motor and wheel assembly shall be removable from the housing. Motor speeds shall not exceed 1,500 RPM and all fan motors shall be suitably grounded and mounted on rubber-in-shear vibration isolators. Provide insulation on all discharge duct where required to prevent condensation. Units shall have metal face grille. Provide reinforced aluminum backdraft damper with continuous aluminum hinge rod and brass bushings. Pressure drops, fan speeds and horsepowers to be adjusted for sound block. Units to have wall caps, brick vents, roof caps, where required and/or shown. Controls to be Solid State control, unless otherwise indicated. Where units are used for inline applications, provide inlet duct collar and delete face grille.
- 3. In-line centrifugal fans shall be constructed of welded steel, inlet and outlet diameters shall be the same size. The fan wheels shall be the backward curved centrifugal type with non-overloading characteristics, constructed with die-formed, aerodynamic blades, continuously welded to a flat radiant blackplate.

### 2.03 ROOFTOP GRAVITY RELIEF VENTILATORS

- 1. Furnish an install, where shown on the plans, spun aluminum, roof mounted gravity ventilator. The unit shall be of bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum structural components shall be constructed of minimum 16-gauge marine alloy aluminum, bolted to a rigid aluminum support structure. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. The spun aluminum baffle shall have a rolled bead for added strength. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM and static pressure. Unit shall be shipped in ISTA certified transit tested packaging.

SECTION 15810 - AIR HANDLING EQUIPMENT

PART 3 EXECUTION

1. Provide all hanging materials and vibration isolation prior to hanging any unit, verify supports with Structural Engineer.
2. Provide prefabricated roof curbs for all roof mounted equipment. Unibeam Sonotrol type, minimum 12", all galvanized continuously welded construction with integral cants. Minimum 2" thick walls filled with insulation. Provide additional wood nailers so that fan bases rest level on curbs.
3. Provide wall caps or roof caps for ceiling fans flashed and secured as required.
4. All rooftop fans, gravity ventilators and utility sets shall be factory painted color selected.
5. All fans with duct connections or connections to building construction shall have flexible connections as specified in Section 15860.
6. All exhaust fans shall have backdraft dampers.

END OF SECTION  
15810.6140



## SECTION 15860 - DUCT SYSTEMS

### PART 1 GENERAL

#### 1.01 SCOPE

1. The work under this heading shall include the furnishing and installation of:
  - A. All sheet metal work required for the various systems, including installation of control devices and connections to equipment and all materials and specialties required for the proper functioning of the work.
  - B. All acoustical treatment required for the work as hereinafter specified.

#### 1.02 DUCTWORK CLEANLINESS AND STORAGE

1. Comply with SMACNA, "Duct Cleanliness for New Construction Guidelines", and follow the requirements for the "Advanced Level". After fabrication, seal ductwork and maintain the sealed conditions during transportation, storage and after installation until final cleaning is complete. All ductwork shall be sealed either by blanketing or capping the duct ends, bagging small fittings, surface wrapping or shrink wrapping. Store in a clean, dry environment. Do not install ductwork until the building is clean and dried and maintain the integrity of the sealed ends until final "white glow cleaning" is complete and dust free.

#### 1.03 EXPOSED SPIRAL DUCT

1. All exposed round duct in finished spaces shall be continuous spiral duct. Spiral duct shall be manufactured from galvanized steel ASTM-A-527-71. All ductwork is to be manufactured and installed with materials, fittings and joints designed to be exposed. Duct fittings, air devices and all appurtenances shall be prepared for painting as specified in Section 15010 and be painted color as selected by Architect. Where duct is specified to be acoustically insulated, United Sheet Metal Type "K-27" or approved equal duct to be used.
2. Where spiral duct is shown to be mounted between exposed steel or parallel with steel, the duct shall be installed at same slope roof steel.
3. All exposed spiral ducts shall be painted color selected. All duct, air devices, supports and appurtenances shall be painted.

#### 1.04 PAINTING OF SHEET METAL DUCTS

1. Where exposed duct is to be painted, the following is a guide for surface preparation.
  - A. Surface shall be clean, dry and free from spiral manufacturers' lubricants.
  - B. Remove dirt and grease from galvanized spiral ductwork with water and a non-petroleum-based detergent (Simple Green, TSP, Krud Cutter, Dawn) and wipe dry with a clean cloth.
  - C. Surface shall be free of foreign materials that will adversely affect adhesion or appearance of applied painted coating.
  - D. Contractor shall use DTM (direct to metal) Sherwin Williams paint or approved equal.

## SECTION 15860 - DUCT SYSTEMS

1. Primer/Topcoat – Sherwin Williams B42W Series or approved equal
2. Primer/Topcoat – Sherwin Williams B42T1 or approved equal

E. All oil-based paint shall be in accordance with manufacturers' recommendations for surfaced preparation and primer requirement.

F. The use of alkaline oil-based paint shall not be used.

### 1.05 CONSTRUCTION

1. All ducts shall be constructed of prime quality, re-squared, galvanized steel sheets in accordance with "Duct Manual and Sheet Metal Construction for Ventilating and Air Conditioning Systems" of the "Sheet Metal and Air Conditioning Contractors National Association", (SMACNA) Sections 1 and 2.
2. Gauges shall be as recommended for the use intended in the applicable SMACNA Manuals. All ductwork and other sheet metal shall be properly stiffened and supported as per the applicable recommendations of SMACNA Manuals. Only first quality, smooth, cold rolled sheets of the best grade steel shall be used and shall be guaranteed to double seam without showing fracture.

### 1.04 DIMENSIONS

1. Duct dimensions are **INSIDE CLEAR DIMENSIONS**: Increase metal duct size to allow for thickness of inside insulation.

### 1.05 BALANCING AND TESTING

1. See Specification Section 15190.

## PART 2 PRODUCTS

### 2.01 FITTINGS

1. Round elbows shall be formed or stamped type; use 5-piece construction where stamped fittings are available, centerline radius equal to 1.5 times the duct diameter minimum.
2. All round take offs to be expanded to 90-degree conical type of 45-degree branches.
3. Obstructions: Where possible, avoid locating any pipe, wire or structural member in a duct. Where such obstructions cannot be avoided, duct shall be eased, split or transformed as the Engineer may direct.
4. Transformation: Where changes result in an increase of area slope shall not exceed one (1) in seven (7); where areas remain constant or decrease, slope shall not exceed one (1) in four (4), but one (1) in seven (7) is preferable.
5. Changes in direction: Changes in direction shall be made with elbows or tees as conditions necessitate in the following order or preference:
  - A. Unvaned ell, centerline radius equal to 1.5 times duct width.

## SECTION 15860 - DUCT SYSTEMS

- B. 6" throat radius with full radius vanes and heel radius.
  - C. 3" throat radius with full radius vanes and heel radius.
  - D. 3" throat radius with 3" heel radius, double thickness vanes.
  - E. No square elbows without turning vanes allowed.
6. Branch Takeoffs: Made, in order of preference, with radius elbow, radius tap-in or suitable vanes in a square takeoff.

### 2.02 JOINTS

1. All connections of duct shall be installed in strict accordance with SMACNA standards, except that all exposed non-spiral duct with design pressure less than 2" W.C. or 2,500 fpm velocity in finished areas shall use streamline joints.
2. Mechanical joint fasteners, such as "Ductmate" or approved equal, will be allowed and shall be installed in strict accordance with manufacturers' requirements. Where mechanical fasteners are used, contractor shall coordinate joint locations with all other trades for clearances. Where use of mechanical fasteners result in an increased requirement for space and clearance and results in modification, removal, replacement, or new work for this Contractor or other contractors work; the work shall be done at this Contractors' expense and with no additional cost to Owner. These joints shall not be used for exposed duct in furnished areas.
3. Where any joint is installed in any duct below 7'0", installation shall have protection as specified under ductwork installation.
4. All joints shall be sealed as specified for air tightness.

### 2.03 DAMPERS

1. Furnish and install all dampers. Dampers for automatic operation shall be minimum leakage, multi-opposed type with neoprene balloon edge and snap steel side.
2. Outside air dampers for rooftop units shall be able to be closed within 30 seconds.

### 2.04 VOLUME DAMPERS, SPLITTERS AND ADJUSTABLE DEFLECTORS

1. Volume dampers shall be installed in all of the trunk and branch ducts, no exceptions. The balancing trade shall not depend upon register shutters or dampers for balancing. The sheet metal contractor shall submit shop drawings to the balancing contractor for his review of location, type, size, and quantity of balancing dampers. Where additional control devices or alternate methods of duct installation are suggested and/or required, these shall be provided, and all modifications made at no additional cost to Owner.
2. Volume dampers shall be Everlock locking type manual volume dampers as manufactured by Rossi HVAC Hardware ([www.RossiHardware.com](http://www.RossiHardware.com) – [info@rossihardware.com](mailto:info@rossihardware.com) – (818) 252-3811 or approved equal.
3. Bracket – Cold rolled Steel (ASTM A-1008), 18-gauge nominal thickness of 0.0478 with tolerance range of 0.0438 to 0.0518. single cut and formed bracket for use with 1.5" or 2.0" insulation wrapping or any other such stand-off applications. Finished with a white Chromate plating.

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4. Handle and Thumb Trigger – Polyamide 66 (PA66), flame retardant, glass reinforced, “Zytel”.
5. Retaining Spring – Ext. self-lock TX-75ST-ZF carbon steel SAE 1074 with zinc bright plating. C-scale Rockwell hardness 47 to 51.
6. Blades
  - A. 4” to 14” dia. single blade (or disc). ASTM-A527 LFO G90, 20-gauge reinforced to equal strength of 18-gauge material.
  - B. 3/8” full length bar fits through formed channel in center of damper blade.
7. Bars – 3/8” square aluminum bar.
8. Bearings
  - A. Snap-in bearings for medium and low-pressure systems. Polyamide 66 (PA66), flame retardant, glass reinforced, “Zytel”.
  - B. B-lined bearings for lined duct. Polyamide 66 (PA66), flame retardant, glass reinforced, “Zytel”.
9. Splitter dampers shall be installed where shown on drawings. Splitters shall be made of 18-gauge galvanized steel or heavier and shall be cross broken and flanged or hemmed for rigidity. Splitters shall be made easily adjustable and readily accessible for adjustment.
10. Adjustable deflectors and adjustable turning-vane devices for diverting air flow from a duct main into a branch duct shall be multi-blade assembly hinged at one end and so constructed that, as it is closed, the air passage between the blades narrows until no air passage remains when the assembly is in the fully-closed position.

### 2.05 FIRE DAMPERS

1. Fire dampers shall be provided and installed at all places where duct passes through a floor, fire wall, fire rated ceiling or other fire division, or as required by applicable codes.
2. Steel curtain dampers may be used in any system but are required 100% free area.
3. Fire dampers shall comply with UL-555 and shall bear the label of an approved agency. Fire dampers shall be installed in accordance with manufacturers’ installation instructions.
4. Provide access doors at all fire dampers. Note – Access doors in rooftop duct shall be constructed and insulated as specified for outdoor ducts.
5. This Contractor shall, prior to shop drawing preparation, coordinate with general contractor, the location of all fire dampers based on architectural plans and/or existing construction. Where access doors are required behind any inaccessible area, this Contractor shall furnish and install access panels in general construction which shall be suitable for servicing of dampers.
6. Where due to existing and/or new construction of any trades, access to fire dampers are not possible prior to duct installation. This Contractor shall notify the architect and/or engineer.



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### 2.06 ACCESS DOORS

1. Access doors of suitable sizes minimum 18"x18" shall be provided for access to all coils, dampers, controls, etc.; in insulated duct, door shall be double panel, insulated type.

### 2.07 FLEXIBLE CONNECTIONS

1. Flexible connections shall be provided to motorized equipment, made with at least 3" of neoprene coated fiberglass cloth with 1" slack material (except kitchen hood exhaust).

### 2.08 FAN DISCHARGE, BACK DRAFT AND RELIEF DAMPERS

1. Air/Dynamic as manufactured "Air Balance" or approved equal.

### 2.09 LOUVERS AND SCREENS

1. All louvers shall be 45 degree, 4" deep, drainable louvers. Blades shall be stationary with two (2) drainable gutters incorporated. Head/jamb frame shall be drainable and resist water penetration. Material shall be 0.081" extruded aluminum. Provide optional welded frame, bird/inset screen, as manufactured by Airolite Model K6844 or approved equal. Provide insulated blank off panel with 0.032" aluminum skin to match louver finish. Coordinate and provide necessary trim and attachment details.
2. Louver panels shall be continuous within the specified masonry openings. Coordinate required sizes, total depth, offset to new equipment, etc. with field conditions and necessary modifications, attachment methods, gaskets, etc. Seal perimeter so not to restrict louver drainage mechanism. Document and submit field verified and equipment coordinated louver specifics via shop drawing submittal. Finish shall be Owner/architect selected custom color (non-metallic and non- exotic) Kynar painted finish as required to match brick or Owners' color sample.
2. An aluminum painted screen (½ " mesh) in an aluminum frame shall be provided over the louver in such a way as to be easily removable for maintenance.
3. Where air intakes or relief discharges occur on roofs, prefabricated aluminum curbs (maximum height 12"; minimum height 4") shall be provided one inch higher than gravel stop or parapet scuppers and properly flashed. Aluminum rain hoods or goosenecks, unless otherwise shown, shall be provided thereon, so designed as to prevent rain entrance, provide low frictional resistance and have rigid construction, each provided with removable screen.
4. Where louvers have internal component and/or their associated dampers as indicated on drawings and/or specifications, all internal portions shall have a metal protective screen. Screen shall be constructed to allow for specified air flow.
5. Screen shall be of adequate size, dimension and configuration to allow for proper air flow and protection of internal components.
6. Provide hinged access for components requiring maintenance.
7. Screen shall be removable. Paint screen and all components color selected.

## SECTION 15860 - DUCT SYSTEMS

### 2.10 GAS VENTS FOR DOMESTIC HOT WATER HEATER

1. 4" dia. PVC inlet and outlet connect to hot water heater wall mounted combination termination kit. Install per manufacturers' requirements.

## PART 3 EXECUTION

### 3.01 AIR DELIVERY AND NOISE

1. This Contractor shall guarantee that all equipment shall operate without objectionable noise or vibration; that all ductwork shall be free from pulsation or objectionable noises; that the volume of air specified will be delivered to all points of supply and exhaust.
2. After this system is in operation, should the ductwork be found to vibrate or chatter, Contractor will be required to eliminate same.

### 3.02 TESTING OF AIR DISTRIBUTION SYSTEM

1. The volume and velocities of air at all terminals, outlets and inlets, shall be tested.
2. The volume dampers, splitters and deflectors shall be adjusted so that the air velocities and volume will be as specified.
3. See Section 15010 "Start Up and Adjustments" and 15191 & 15950 for balancing and testing.

### 3.03 DUCTWORK INSTALLATION

1. All ductwork shall generally be installed in the location and manner shown and detailed on the drawings with all fittings and connections made in accordance with the applicable SMACNA Manuals. Duct shown on drawings are diagrammatic. Contractor to determine in field exact routing, size and configuration. All modifications or deviations required by job conditions must be approved prior to any fabrication.
2. Prepare all ductwork and set it in place before furring begins. Extend all damper operators and serviceable or adjustable devices to accessible locations.
3. All connections from sheet metal assemblies such as ductwork, plenums, etc., to operating machines and/or mechanisms such as fans, air conditioners, etc., shall have flexible connections.
4. Where any ductwork is mounted lower than 7'-0" above a finished floor line, all seams in ducts shall be flattened and filed so that no standing seams or angle bracing protrudes from the duct in any manner which could cause injury to personnel. Covering of standing seams with an approved flexible bumper material, like split Armaflex pipe insulation, is acceptable.
5. Coordinate exact location of all duct in field with existing construction. Coordinate location of all duct with truss manufacturer.
6. All ductwork shall be delivered and sealed in accordance with SMACNA requirements and sealing shall only be removed prior to installing duct. After installation, duct shall still be protected from water damage.

## SECTION 15860 - DUCT SYSTEMS

### 3.04 ROOF PENETRATIONS

1. All roof penetrations shall have roof curb minimum 12" high with cant strip, flashing collars, flashing and counterflashing.
2. Provide sloped roof curbs at sloped roofs. Verify all curbs with roof conditions prior to shop drawing submission.
3. All roof curbs shall be installed per SMACNA requirements.
4. Where re-roofing work requires higher curbs due to new insulation, these shall be used. Coordinate with general contractor for exact location.
5. Gooseneck terminations are not permitted.

### 3.05 AIR TIGHTNESS

1. All ductwork shall be airtight as defined by ASHRAE and SMACNA. All transverse joints, longitudinal seams and duct wall penetrations shall be sealed in accordance with ASHRAE 90.1 latest edition and have adhesive (3M EL-750 or approved equal). Pressure sensitive tape shall only be allowed for supply air duct with design pressures less than 2" W.C. in return air plenums.

### 3.06 FAN DUCT CONNECTION

1. All duct connections to fans and/or equipment with fans shall be installed in strict accordance with fan manufacturer's requirements. Ducts shall be installed to eliminate any system effects pressure losses. Where ducts are shown or are required to be installed that are not in compliance with manufacturers requirement, the additional pressure losses due to the system effect shall be added to the fans specified static pressure and fan size increased accordingly. All work shall be done at no additional cost.
2. Where elbows are required at discharge, they shall be full radius elbow  $R/W = 1.5$  or greater.
3. All discharge dampers shall be arranged and installed in accordance with manufacturers' requirements and to avoid any system effects.

END OF SECTION  
15860.6140



SECTION 15870 - TEMPERED AIR TERMINAL UNITS

PART 1 GENERAL

1.01 SCOPE

1. Furnish and install all air terminal devices in sizes, types and capacities shown on the drawings.

1.02 RATINGS

1. Manufacturer shall rate all terminals in accordance with Air Diffusion Council (where applicable).

PART 2 PRODUCTS

2.01 REGISTERS AND GRILLES

1. All supply air registers shall be METAL\*AIRE Model V4004D-1 or approved equal consisting of two (2) banks of fins, front bank vertical, second bank horizontal, with one (1) bank of multi-opposed damper blades operated by a concealed screwdriver operator.
2. All return and exhaust air registers shall be METAL\*AIRE Model RHD-1 or approved equal consisting of one (1) bank of horizontal fins fixed at a 45-degree angle with one (1) bank of multi-opposed damper blades operated by a concealed screwdriver operator.
3. Where grilles are shown, omit the damper.
4. All registers and grilles shall be of aluminum construction with baked enamel finish.
5. All registers and grilles shall be heavy-duty type.

PART 3 EXECUTION

3.01 INSTALLATION

1. All devices shall be mounted true and square, pulled up tightly without distortion.
2. Provide equalizing deflectors and/or air extractors where required to achieve proper air distribution.

3.02 FIRE RATED CONSTRUCTION

1. All devices in fire rated construction shall be provided with approved fire dampers, "tents", or other devices as required to conform to applicable regulations.

3.03 VISIBILITY

1. Where registers and grilles are at floor level and inside duct is visible, provide acoustic insulation (black) or where insulation is not specified or required, paint all visible inside surfaces of duct flat black.

END OF SECTION - 15870.6140



## SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

### PART 1 GENERAL

#### 1.01 SCOPE

1. The work under this heading shall include the furnishing and installation of:
  - A. A direct digital control system which shall be complete and consist of the network controllers, local controllers, unitary stand-alone controllers, sensors, safety thermostats, control valves, damper actuators, relays, transformers, fuses, terminal strips, control panels, position switches, pilot lights, all appurtenances and all software necessary to provide the sequence of operation.
  - B. Connections to all equipment requiring connections to the control medium whether furnished under this Section or not.
  - C. The system shall use the latest technologies and software available in the implementation of Direct Digital Electronic Control for the HVAC system and its management.
  - D. The systems shall be installed by factory trained technicians, regularly employed by the manufacturer and factory trained in the installation and calibration of the product.
  - E. If system is not installed by employees of the control equipment manufacturer, then system shall be installed by an independent factory authorized distributor/contractor meeting the following qualifications:
    1. All ATC Contractors must be in the business on installing electronic direct digital temperature controls for seven (7) years.
    2. All ATC Contractors must have installed and completed at least five (5) electronic direct digital temperature projects of similar size and design using the same equipment as specified.
    3. All ATC Contractors must have an office in a geographic area within 35 miles of the project.
    4. All ATC Contractors must have capabilities of doing component level repairs on electronic systems.
    5. System shall be installed and serviced by technicians' factory trained in the installation and calibration of the equipment.
    6. Provide system in accordance with specifications.
  - F. This Contractor shall be responsible for all programming, calibration, the proper operation and adjustment of all controls, dampers and appurtenances to provide required sequence of operations and protection against freeze-ups.
  - G. All equipment provided by this Contractor and required to be controlled, shall be capable of being controlled and monitored from this ATC system.

## SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

H. All training and instruction per Section 15010.

I. All bidders must be an authorized certified distributor of the manufacturer specified.

### 1.02 WARRANTY

1. Provide two (2) year service agreement, which is to begin upon acceptance of the system by the Owner (see "General Conditions"). At the expiration of the warranty period, provide service agreement to include full coverage, parts and labor, plus emergency service for the new system for an additional one (1) year period.

### 1.03 CONTROL SYSTEM SCOPE OF WORK

1. The following scope of work is to be used as a guide and reference only. Exclusion of any item specified elsewhere or required for system operation shall not relieve the contractor of the responsibility to provide a complete operable, practical, and usable system. It is the intent of these specifications to provide a stand-alone electronic control system able to provide control for all new equipment (as specified) and have all components to allow for a future connection to the existing CM3 DDC system.

## PART 2 PRODUCTS

### 2.01 GENERAL

1. Provide electronic control products in sizes and capacities indicated, consisting of valves, dampers, thermostats, clocks, sensors, controllers and other components as required for complete installation.

### 2.02 ELECTRONIC OPERATORS

1. Size electronic actuators to operate their appropriate dampers or valves with sufficient reserve power to provide smooth modulating action or two-position action as specified. When so specified in sequence of operation, where more than two (2) actuators are to be operated in sequence to each other, provide position feedback positive positioners with adjustable start point and operating range.
2. Provide unit outside air damper motors with adjustable minimum settings so that ventilation requirements may be adjusted for each space or room.
3. Provide spring return for outside air dampers.
4. All damper actuators located in finished spaces shall be internally installed in duct and/or units with access doors. Increase duct size accordingly.
5. Access to all damper and valves in toilet room shall be the lockable access panels.

### 2.03 DAMPERS

1. Modulating dampers shall be opposed blade type. Air handling unit outdoor, relief and return air dampers shall be parallel blade type arranged to combat stratification. Two (2)



## SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

position dampers shall be parallel blade type. Damper frames shall be not less than 13-gauge galvanized steel. Damper blade shall not be over 8" in width and 48" in length.

2. Blade edges shall have inflatable seal edging rated for less than 10 CFM/Sq.Ft. of damper area. Damper hardware shall be zinc plated, bearings shall be nylon, Teflon, Oilite or approved equal.
3. Damper operators shall be mounted outside of duct on device unless factory installed or internally mounted with access panels. All dampers on equipment exposed in finished spaces shall have internal mounted operators, increase duct size accordingly.
4. Provide access doors to all dampers.

### 2.04 VALVES

1. Valves shall have hardened and polished stainless-steel stems, brass bodies and packing shall be Teflon, spring loaded self-adjusting type. Where packing is required valves shall back seat to permit repacking under pressure.
2. Water flow control valves shall be fully proportional action two-port and/or three-way mixing or diverted valves. Valves designed for 150 psig WWP and pass required volume of water with not greater than 10' head loss. Indicate pressure drop on shop drawings. Valves to be ANNSI Class 125.
3. Valves in steam lines shall have characterized throttling plugs and sized for minimal drop of 50% of the steam supply pressure.
4. All valves in systems where equipment and/or pipes which valves feed are subject to freezing conditions shall be normally open. Valves used as part of hot water system under emergency conditions (loss of power) shall be normally open.
5. Furnish as part of shop drawing, valve schedule indicating Cv of valves, valve sizes, types and valve positions (N.O., N.C. last position).

### 2.05 DAMPER MOTORS

1. Motors shall have sufficient force to position dampers smoothly throughout the entire stroke and shall be so constructed that they can be serviced without removal of the motor from its mounting bracket and be located outside of airstream.
2. Valve operators shall be designed for harmonious integration into automatic temperature control systems.

### 2.06 ROOM THERMOSTATS

1. Room thermostats shall be electronic with metal housing suitable for recessing in toilet rooms. Thermostats shall be adjustable, by use of pushbutton or similar device on face, from rooms 4°F. +/- . All thermostats in non-supervised areas or areas accessible to public shall have lockable metal covers. For sensors on exterior walls, provide insulation (minimum 2" thick R=8.0). Sensors shall be located so that they will not be influenced by

## SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

the mechanical system or heat producing equipment. Thermostats installed not in accordance with above shall be relocated and construction repaired at no additional cost to Owner.

2. Mount all thermostats as required by ADA unless otherwise directed or required by code.
3. The exact location of thermostats to be determined in field with Owner. Submit location for review with shop drawings. As part of bid, Contractor to include sufficient wire to relocate sensor 5'  $\pm$  from location shown and where interference occurs, sensors shall be relocated (after final installation) at no additional cost to Owner.
4. Where thermostats are shown to be located behind grilles. Provide hinged access and mark location.

### 2.07 SENSORS AND CONTROLLERS

1. Temperature sensors and transmitters shall be of the rigid stem type using bi-metallic sensing elements excepting where averaging elements are required for accurate indication.
2. If thermometers, sensors, or transmitters have filled, capillary type thermal systems, these thermal systems shall be temperature compensated and all exposed capillaries shall be installed in protective metal enclosures (EMT), in an approved manner.

### 2.08 PROTECTIVE FREEZESTATS, FIRESTATS AND SMOKE DETECTORS

1. Provide for gas furnace freezestat located on the suction side of the fan. When its setting is exceeded, perform the following:
  - A. Close outside air damper and stop fans.
  - B. All protective devices shall be manually reset.
2. Note – Freezestats shall be de-energized when units are drained in water.

### 2.09 CONTROL

1. Pilot positioners shall be installed on all controlled devices that operate in sequence.
2. Temperature, relative humidity and pressure transmitters shall be direct acting instruments capable of transmitting an electronic signal in direct proportion of the medium change.
3. Fluidic controllers shall be of the single, dual or three (3) input modes as required to meet the specified sequence of operation and be direct or reverse acting as required with ranges to match their respective transmitters.
4. All controls that are exposed to the outdoor elements shall be mounted in weatherproof boxes. These boxes will in no way interfere with the operation or sensing of these controls.

## SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

### 2.10 OPERATOR INTERFACE

1. Operator interface to the system shall be through a workstation utilizing graphical operation. The system will consist of workstations on site, final locations to be determined in field.
2. Remote workstations shall be fully capable of all on site operation functions and shall include a standard dial up phone modem or the building shall have ethernet LAN for the transmission of data to the remote workstation.
3. The stand-alone electronic control system shall utilize a laptop computer for operator interface. Laptop computer shall be provided by contractor and be a MAC capable of supporting all software.

### 2.11 SYSTEM APPLICATION CONTROLLERS

1. The Building Automation System shall be composed of one or more independent, stand-alone, microprocessor-based System Application Controllers.
2. The System Application Controller shall have ample memory to support its operating system, data base, and programming requirements.
3. The operating system of the system Application Controller shall manage the input and output communications signals.
4. Data shall automatically be shared between network and System Application Controllers.
5. Remotely monitored System Applications Controllers including automatically dialing out alarms, gathering alarms, reports and logs, programming and downloading databases.
6. The controller shall continually check the status of all processor and memory circuits. If a failure is detected, the controller shall:
  - A. Assume a predetermined failure mode.
  - B. Display card failure identification.
7. Controllers, where required to be outside of mechanical room, shall be located in electric rooms or similar type of usage.

### 2.12 APPLICATION SPECIFIC CONTROLLERS

1. Application Specific Controllers shall be stand-alone, microprocessor based Direct Digital Controllers, pre-programmed, tested, and factory mounted on the mechanical equipment to ensure reliability. Where factory mounting is not possible, the controllers shall be factory programmed and tested. Controllers shall be clearly labeled and fully tested upon installation.
2. The controller shall communicate with other devices on the communication network and be fully integrated with the other system components.

## SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

3. Where specified in the sequence of operations or points list, the controller shall have a display and LCD keypad with password capability for local interface with the mechanical equipment.
  - A. A keypad and display shall be mounted on the unit it is controlling.
4. The hardware for custom application and specific controllers shall be suitable for the anticipated ambient conditions.
  - A. Controllers used outdoors and/or in wet ambient shall be mounted within weatherproof enclosures, and shall be rated for operation at -40°F. to 155°F.
  - B. Controller used in conditioned ambient shall be mounted in dust-proof enclosures, and shall be rated for operation at 32°F. to 120°F.

### 2.13 CUSTOM APPLICATION CONTROLLERS

1. The Custom Application Controllers shall provide stand-alone control and require no additional system components for complete operation. It shall have sufficient memory to support its operating system, database, and programming requirements.
2. All programming required for operation shall be memory resident and shall be retained in permanent memory.
3. The Custom Application Controller shall be configured such that the Portable Operator Interface can be used unless permanent display is specified.

### 2.14 INPUT/OUTPUT INTERFACE

1. Binary inputs shall allow the monitoring of on/off signals from remote devices and be compatible with all other system devices. All status points shown on the point list shall be positive proof differential pressure or current sensing binary switches.
2. Analog inputs compatible with sensing devices and field devices shall allow the monitoring of system and shall have a minimum resolution of 0.1% of the sensing range.
3. Binary outputs shall provide a continuous low voltage signal for on/off control of remote devices or binary outputs shall have 3-position (on/off/auto) override switches and status lights.
4. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0 to 10 VDC or a 4 to 20 milliampere signal as required to provide proper control of the output device.
5. System architecture shall allow for point expansion in one of the following ways:
  - A. A slave controller may be used to expand point capacity.
6. Points list shall include all functions of the system being controlled (whether specifically shown or note) and be submitted for review prior to shop drawing submission.

## SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

### 2.15 AUXILIARY CONTROL DEVICES

1. Locate all sensors and probes inside duct and/or equipment and all controllers outside of equipment. Provide enclosures where subject to damage. All outdoor sensors shall be enclosed in weatherproof enclosures.
2. Temperature Sensors
  - A. Temperature sensors shall be Resistance Temperature Detector (RTD) or Thermistor as dictated by the requirements of this specification.
  - B. Duct sensors shall be rigid or averaging as specified in the sequence of operations. Averaging sensors shall be a minimum of 5 feet in length.
  - C. Immersion sensors shall be provided with a separable stainless steel well.
  - D. Space sensors shall be equipped with setpoint adjustment and/or override switch.
  - E. Accuracies shall be +/- 1°F. for standard applications. Where high accuracy is required, accuracies shall be +/- 2°F.
3. Humidity Sensors
  - A. Humidity sensors shall be capacitance or bulk polymer resistance type.
  - B. Duct and room sensors shall have a sensing range of 20% - 80% with accuracy of +/- 5% R.H. Duct sensors shall be provided with a sampling chamber.
  - C. Outdoor air humidity sensors shall be a sensing range of 10% - 95% R.H. It shall be suitable for ambient conditions of -40°F. - 170°F.
4. Differential Pressure Switches
  - A. Differential Pressure Switches shall be furnished as indicated for status purposes in air and water applications. Provide single pole double throw switch with fully adjustable differential pressure settings.
5. High Limit Thermostats
  - A. High limit thermostats shall be manual reset type.
6. Low Limit Thermostats
  - A. Safety low limit thermostats shall be vapor pressure type with a 20-foot minimum element. Element shall respond to the lowest temperature sensed by any one-foot section.
  - B. Low limit shall be manual reset only.

## SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

### 7. End Switches

- A. Provide end switches for all motorized dampers where required to provide proper operation. All end switches shall be controlled by damper blade position and not the actuator.

### 2.16 ROOM SENSORS

1. Room sensors shall be electronic. Sensors shall have adjustable from rooms. All sensors in non-supervised areas (toilet rooms, cafeteria, gym and corridors) shall have lockable metal covers. For sensors on exterior walls, provide insulation (minimum 2" thick R=8.0). Provide with pushbutton occupied/unoccupied override. Sensors shall have LED indication.
  - A. Wall Mounted Combination Sensors (Demand Control Ventilation System Only) - provide wall mounted combination sensors which shall contain a space temperature sensor and CO<sub>2</sub> sensors in a single, decorative housing. The CO<sub>2</sub> sensor shall use single-beam absorption infrared diffusion technology (non-dispersive infrared) and shall have integral programming to perform automatic baseline calibration without use interface. The recommended manual recalibration period shall not be less than five years. Other features of wall-mounted combination sensors shall include:
    - Operating Conditions: 60°F. to 90°F. (15°C to 30°C.) and 0% to 95% RH, non-condensing
    - Power Supply: 18-30 VAC, 50/60 Hz (18-42 VDC polarity protected)
    - CO<sub>2</sub> Sampling Method: Diffusion
    - CO<sub>2</sub> Sensor Output: 4 to 20 mA or 0 to 10-volt signal
    - Sensitivity: ±20 ppm
    - Accuracy: ±100 ppm to 60°F. to 90°F. (15°C. to 32°C.) and 760 mmHg
    - CO<sub>2</sub> Sensor Calibration: Single point calibration via push button and LED
    - Space Temperature Sensor: 10K ohm ±2% at 77°F. (25°C.) thermistor
2. Refer to Part 3 for room sensor installation specifications.

Combination sensors shall be provided with the manufacturer's recommended Carbon Dioxide calibration kit. The quantity shall be suitable to initially calibrate each sensor provided for the project.

## PART 3 EXECUTION

### 3.01 ELECTRIC WIRING

1. All power and control wiring in connection with the temperature control system shall be furnished under this contract.
2. All electrical controls and switches shall be suitable either for 120 volts, 60 Hz or 24 VAC.
3. For control circuits of 115 volts and above, all wire shall be rated for 600 volts and may be either single or multi-conductor cable.

## SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

4. For control circuits below 30 volts, all wire shall be rated for 300 volts and may be either single or multi-conductor cable.
5. All electrical sensing element wire shall be in accordance with manufacturers' recommendation with the proper number of conductors, equivalent to Beldon No. 8770 and installed in "EMT" conduit in mechanical room. This cable shall not be installed in the same conduit with any conductors for voltages of 115 or above.
6. Electrical work provided shall include, but not limited to:
  - A. Wiring from all control devices furnished to the respective equipment being controlled.
  - B. Furnishing and installation of all necessary conduit and wire.
  - C. Interlocking wiring between rooftop units, exhaust fans and radiation as specified in the sequence of operations, shown on the drawings or otherwise required.
  - D. Installation of smoke detectors and wiring to fan starter.
  - E. Wiring of flow switches, sequence relays, thermostats and permissive circuits to boilers.
  - F. Wiring in finished spaces shall be fully concealed and where it is not possible to conceal wiring, contractor to provide metal raceways. All locations and the use of metal raceways shall be approved by the architect.
7. Metal raceways shall be stamped one-piece metal minimum 18-gauge, factory painted color selected and secured to prevent vandalism.
8. In locations where wire cannot be installed above ceiling, wire shall be run in metal raceways.
9. All new DDC wiring is to be concealed. In existing building, where possible, use existing pneumatic tube chase or wall cavity. Where not possible as determined by school representative, wiring may run in metal raceway, painted color selected. Submit locations, route and all details for review prior to installation.

### 3.02 INSTALLATION OF VALVES AND DAMPER MOTORS

1. All control valves and damper motors shall be furnished by temperature control manufacturer and installed by this Contractor or manufacturer of equipment in whose work it is to be mounted, regardless of who furnished equipment.
2. Where damper motors are provided by equipment manufacturer, they shall be completely integrated with the ATC system. The contractor is responsible for all coordination of work not in accordance with above at no extra cost to Owner.

## SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

### 3.03 DRAWINGS AND LAYOUT

1. This Contractor shall provide diagrams of the automatic temperature control system, which shall show all control equipment, and the function of each item.
2. The following data/information shall be submitted in accordance with general conditions:
  - A. Complete sequence of operation.
  - B. Color coded control system CAD generated drawings including all pertinent data to provide a functional operating system.
  - C. Valve and damper schedules showing size, configuration, pressure losses, capacity and location of all equipment.
  - D. A description of the installation materials including conduit, wire flex, etc.

### 3.04 EQUIPMENT CONTROLS

1. All controls required and/or specified to be installed by the ATC Sub-Contractor in equipment to be furnished under this Contract unless installed by the equipment manufacturer, shall be sent to the equipment manufacturer and be factory installed.
2. The controls may be field assembled by ATC Sub-Contractor. However, this Contractor shall assume all responsibility for proper operation of the mechanical equipment and coordination of the work.
3. When controls, dampers, valves, etc., are mounted in equipment furnished by others, the ATC Sub-Contractor shall provide all required electric wiring and appurtenances and include connection to the equipment as required for system to function as specified.

### 3.05 ROOM SENSORS

1. Room thermostats shall be electronic with metal enclosure and LED display. Sensors shall be adjustable from rooms 4°F. +/- . All sensors in non-supervised areas shall have lockable metal covers. For thermostats on exterior walls, provide insulation (minimum 2" thick R=8.0). Sensors shall be located so that they will not be influenced by the mechanical system or heat producing equipment. Sensors installed not in accordance with above shall be relocated and construction repaired at no additional cost to Owner.
2. Mount all sensors as required by ADA unless otherwise directed or required by code.
3. The exact location of sensors and/or thermostats to be determined in field with Owner and be coordinated with the final furniture layout. Submit location for review with shop drawings. As part of bid, Contractor to include sufficient wire to relocate sensor 5' ± from location shown and where interference occurs, sensors shall be relocated (after final installation) at no additional cost to Owner.
4. Where sensors are shown to be located behind grilles, provide hinged access and mark location.
5. All room sensors shall have timed override control (in addition to specified overrides).



## SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

### 3.06 VALVE, DAMPER AND CONTROL DEVICE LOCATION AND ACCESSIBILITY

1. All control equipment requiring service or adjustment located above suspended acoustical ceiling shall have their locations permanently marked on ceiling. Markings shall consist of a color scheme. The markings shall be permanently applied to surface with legend and location agreed to and provided to Owner. Provide in addition to chart, a permanently mounted graphic display as to locations of the devices.
2. All devices shall be located to be accessible and easily maintained and if found inaccessible, shall be relocated by this Contractor at no additional expense to Owner, regardless of the trades involved.
3. Where devices are behind general construction, provide access doors.

### 3.07 ATC PANELS

1. The location of ATC panels is indicated on plans. Panels to have emergency power electrical connections. Final location and quantity of panels per owner and final requirements of ATC system. This Contractor shall be responsible to coordinate all power wiring requirements as to location, quantity, and wire size with electrical contractor. Extension of services, new power wiring for additional panels, and all modifications to panels which affect electrical contractor shall be the responsibility of the ATC contractor.
2. All ATC panels, controllers, and equipment that require continuous uninterrupted power supply are to remain in operation and shall have battery and/or UPS back-up provided by this Contractor. The back-up shall be for a minimum of 3 hours and shall allow for an orderly shutdown. Resetting, rescheduling, or reprogramming of controls will not be allowed based upon failure to meet the intent of this specification. No unit controllers or ATC panels shall be located above the ceiling.

### 3.08 CO2 SENSORS

1. Where indicated on plans provide CO2 sensors.
2. CO2 sensors are to be located in return air path and shall modulate outside air dampers from closed to minimum.

### 3.09 CO SENSOR

1. Provide CO sensor for all gas-fired units. Locate in room served. Where units serve multiple rooms; locate CO sensor in first room served.
2. Sensor shall be wired to DDC system and be an alarm condition.

## PART 4 HARDWARE POINTS

1. Exhaust, Supply & Transfer Fans
  - Fan Start/Stop
  - Supply Fan Status - Current Transducer

## SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

- Automatic Damper Operation (where applicable)
  - Room Temperature Setting (where applicable for ventilation)
2. Unit Heaters
    - Fan Start/Stop
    - Supply Fan Status
    - Monitor & Reset Temperature
  3. Cabinet Unit Heaters – Alternate Bid #1
    - Space Temperature
    - Valve Control
    - Fan Operation

### PART 5 SEQUENCE OF OPERATIONS

Sequence of operations are typical for all equipment of the type identified.

#### 5.01 TOILET ROOM FANS

1. Fans shall be energized for DDC system and for local control.
2. Normally fans are off and are only energized during outdoor activity. The times of occupancy and duration shall be determined by Owner.
3. Whenever fans operate, the damper or the outside air intake shall open.
4. Provide a room low limit control in each room shall, upon a fall below setpoint, close outside air damper and stop fan. After a set predetermined period, the fan shall be allowed to operate.

#### 5.02 STORAGE ROOM FANS

1. Provide room thermostat which shall energize fan and open dampers. Thermostat shall be set initially to 85° F.

#### 5.03 TICKET BOOTH FAN

1. Provide 0-2 hours control which shall energize fan.

#### 5.04 SMALL MEN'S ROOM, WOMAN'S ROOM & FAMILY ROOM FANS

1. Provide 0-2 hours control which shall energize fan.

#### 5.05 CONCESSION FAN

1. Provide room thermostat set at 75° F. which shall be energized upon a rise above setpoint.

SECTION 15930 - ELECTRONIC DIRECT DIGITAL STAND-ALONE CONTROL SYSTEM

5.06 CONCESSION HEATER

1. Provide room thermostat to energize gas fired heater and open damper on outside air intake.
2. When in unoccupied heating mode, close dampers on fresh air inlet and on intake to room, open bypass return damper from toilet rooms.
3. When in occupied heating mode, open fresh air damper on unit, open outside air intake to toilet room and close bypass damper.
4. When in occupied mode and no heating is required, open outside air damper to room, de-energize unit, close bypass return damper from toilet room.

5.07 TOILET ROOM (LOCKER) – ALTERNATE BID #1

1. When in occupied heating mode, when selected by Owner, open damper to locker room (to allow heated air from locker room to be used for makeup for exhaust). Close damper on outside air to room, energize cabinet heater and radiant panels.
2. When in occupied mode cooling (selected by Owner) the dampers on the intakes from locker room shall open and the dampers from the outdoors shall closed.
3. When in occupied mode (non heating and cooling) damper to outdoors open, damper to locker room closed.

END OF SECTION  
15930.15930



## SECTION 15015 – GENERAL REQUIREMENTS

### PART 1 GENERAL

#### 1.01 SCOPE

1. The General, Supplementary, and Special Conditions, Applicable portions of all divisions and the addenda thereto, are made a part of this Contract.
2. All work described in these specifications shall be the responsibility of the plumbing contractor unless otherwise indicated.
3. It is the intent of these specifications to include all material, service and labor necessary to form a complete and properly operating whole.

#### 1.02 CONTRACT DRAWINGS

1. Examine all drawings and specifications and visit the site to become acquainted with the construction and the extent of the work.
2. In referring to drawings, figured dimensions take precedence over scale measurements. Discrepancies must be referred to the Engineer for decision. Each Contractor shall certify and verify all dimensions before ordering material or commencing work.
3. 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, shall be furnished as though called for in both.
4. When any device or part of equipment is herein referred to as a singular number, such as "the pump" such reference shall be deemed to apply to as many such devices as required to complete the installation.
5. The term "provide" shall mean "furnish and install". Neither term will be used generally in these specifications but will be assumed. The term "furnish" shall mean to obtain and deliver on the job for installation by other trades.

#### 1.03 CODES AND STANDARDS

1. All work shall comply with all regulations and be subject to inspection and approval of authorities having jurisdiction.
2. Where items indicated on contract documents differ from code requirements, contractor shall inform engineer prior to installation. Any construction installed by contractor that is not in compliance with applicable codes, shall be removed, modified, and/or replaced at not additional cost.
3. All equipment shall be labeled by an approved agency.
4. Contractor shall give all notices, obtain and pay for all permits, deposits, and fees necessary.
5. Manufacturer's published data is made a part of these specifications.

## SECTION 15015 – GENERAL REQUIREMENTS

6. Wherever a recognized national organization has published standards these shall be complied with (such as ASA Z 21.30 for gas piping).
- 1.04 REJECTED MATERIALS
1. See "General Conditions".
- 1.05 WORKMANSHIP
1. All work and the execution of same shall be completed in a first class, workmanlike manner and shall conform to the best mechanical practice.
- 1.06 SHOP DRAWINGS
1. See "General Conditions".
- 1.07 AS-BUILT DRAWINGS
1. See "General Conditions".
- 1.08 WARRANTY
1. See "General Conditions".
- 1.09 FIRE RATING
1. All materials used anywhere in the work must have N.F.P.A. rating as follows:
    - A. Flame Spread - Not Over 25
    - B. Smoke Developed - Not Over 50
    - C. Fuel Contributed - Not Over 25
  2. All materials shall be "Self Extinguishing".
- 1.10 EQUIPMENT SELECTION AND SERVICEABILITY
1. All equipment shall be located and installed so that it may be serviced. Demonstrate that there is room to remove all tube bundles, motor and similar equipment. Equipment which is too large or poorly located to permit servicing shall be replaced or repositioned at no additional cost to the Owner.
  2. Where piping or control diagrams or sequencing differ from the recommended piping arrangements of the equipment manufacturer, and will directly affect the equipment performance, the manufacturer's recommendations shall be submitted in writing to the Architect/Engineer for approval, prior to purchasing the equipment involved. This Contractor shall be responsible for obtaining such recommendations from the manufacturers in order to effect correct and perfect operation of the equipment at the capacities and temperatures indicated.

## SECTION 15015 – GENERAL REQUIREMENTS

### 1.11 EQUIPMENT FURNISHED BY OTHER TRADES

1. All equipment furnished and/of installed by other trades requiring connections and services by this Contractor shall have such services provided.
2. This Contractor shall verify exact requirements with shop drawings.
3. This Contractor shall verify all locations, sizes, requirements of services required for equipment in field with Contractor furnishing equipment.

### 1.12 FIRE SAFING

1. Provide fire safing and duct safing per 1996 Boca Code, Section 714. Proseal Systems - Proseal plug device per 93 UL Directory, No 545, F rating for precast concrete. 3M Brand Fire Barrier CP25WB and caulk CAJ 1044 and CAJ 5001, WL1003, WL5011, or approved equal.

## PART 2 PRODUCTS

### 2.01 ELECTRICAL EQUIPMENT

1. This Contractor shall furnish all his equipment complete with motor, controllers, capacitors and starting equipment.
2. Electric motors shall be open, drip proof induction motors rated for continuous duty at 15% overload with 40° C. rise; single phase motor shall be capacitor start-induction run. Motors one-half horsepower shall be single phase, unless otherwise noted (c.f. Division 16). Starting of magnetic across-the line starters equivalent to Furnas Bulletin 14 or approved equal, unless otherwise specified. Thermal overload type, motor rated manual switches shall be furnished for motors ¾ HP and less which do not require magnetic starters for control purposes.
3. Provide FPE/CDE Type 1C Power Factor correction capacitors size to increase full load power factor to 95%. Capacitors shall be fused, in NEMA enclosure, connected between safety switch and motor starter.
4. Where apparatus is specified as "Packaged", all electrical equipment shall be furnished, set and wired to a single point of connection for apparatus as a unit.
5. This Contractor shall set all electrical equipment furnished by him unless same is to be mounted on an electrical panel board, junction box or similar piece of electrical equipment and is to be wired by others.
6. Where electrical characteristics are not shown, all electrical characteristics shall be as indicated on electrical plans. Where there is a conflict between model numbers which indicate electrical characteristics and electrical drawings, the electrical drawings shall take precedent.
7. This Contractor shall verify all electrical characteristics of all equipment with electrical contractor. This Contractor shall submit to electrical contractor location of all motor, starters, other electrical equipment voltage and phase required prior to submission of this Contractors' and electrical contractors' shop drawings.

## SECTION 15015 – GENERAL REQUIREMENTS

8. Should this Contractor change type of equipment which results in change to electrical characteristics, then this Contractor will be responsible to coordinate these changes with all other trades and pay for all required changes.
9. Should this Contractor change electrical characteristics of equipment from that shown on electrical drawings, he is responsible for any extra cost resulting from such change.

### 2.02 ELECTRICAL WIRING

1. This Contractor shall furnish and install all electric wiring required for his contract, with the exception of certain wiring shown under Division 16.

### 2.03 RELIEF VALVES

1. Provide ASME labeled relief valve on each closed fluid system, set to relieve full code capacity at design pressure. Pipe discharge to closed drain or approved receptor.

### 2.04 THERMOMETERS

1. Thermometers shall be 5" diameter dial type with stainless steel cases and separate wells. Ashcroft T-7173T or approved equal, adjustable to any angle.

### 2.05 TAGS

1. This Contractor shall provide a 2" diameter brass tag with stamped service designation and numbers, fastened to each valve with brass chain and "S" hook.
2. Each control, starter, disconnect switch, etc., shall be provided with ¾" x 2½" metal name tag securely fastened to device.
3. Omit name tags on controls exposed in finished spaces.

## PART 3 EXECUTION

### 3.01 METHOD OF PROCEDURE

1. The drawings accompanying these specifications are diagrammatic and intended to cover the approximate and relative locations of the system.
2. Installation, connection and interconnection of all components of these systems shall be complete and made in accordance with the manufacturer's instructions and best trade practices. This Contractor shall erect all parts of equipment to be furnished by him under his Contract at such time and in such manner as not to delay or interfere with other Contractors.
3. This Contractor shall lay out his work and be responsible for the establishment of heights, grades, etc., for all interior and exterior piping, drains, fixtures, conduit, etc., 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 shall be responsible for accuracy thereof. The establishment of the location of all work shall be performed in consideration of the



## SECTION 15015 – GENERAL REQUIREMENTS

finished work. In case of conflict, equipment and/or materials shall be relocated without cost to the Owner, as directed by the Architect, regardless of which equipment was installed first.

4. This Contractor shall cooperate with other contractors for the proper securing and anchoring of all work included within these specifications. Extraordinary care shall be used in the erection and installation of all equipment and materials to avoid marring surfaces of the work of other trades, as this Contractor will be held financially responsible for all such damage caused by the lack of precaution and due to negligence on the part of his workmen.
5. Do not run pipe or conduit for plumbing systems in any concrete slab 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.
6. All piping, conduit and other plumbing materials and equipment shown to be mounted below ceilings are to be kept as close to ceiling areas as possible unless otherwise noted.
7. Items such as valves, cleanouts, etc., that will be concealed in construction shall be installed and so arranged as to be fully accessible for adjustment, service and maintenance.

### 3.02 VISIT TO SITE

1. Due to the nature of the work involved under this Contract, all bidders are required to thoroughly examine the site. Bidding contractors shall 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 this Contract.
2. If discrepancies are noted between requirements of Contract Documents and existing conditions, this Contractor shall so indicate to architect during bidding period and receive clarification before bidding. Failure to comply with this requirement will result in Architect's interpretation during the construction period and architect's decision will be final and binding as the sole interpreter of the Contract requirements.
3. Extras will not be considered for any work relating to connections with existing systems or adaptability of new systems to existing structures.

### 3.03 CLEANING

1. Upon completion of the work, this Contractor shall remove all excess material, debris, tools and equipment from the site, and leave the premises in a broom clean condition.
2. Flush out all piping systems with proper solvents to insure removal of all foreign materials. Clean fixtures, equipment, piping and other surfaces soiled by the work. Remove debris and rubbish on a daily basis.

### 3.04 START-UP AND ADJUSTMENTS

1. After all testing is complete, start each system and make final adjustments for proper flow, temperature and quietness of operation. Record all final results including flows, balance settings, temperature adjustments, pertinent notes and recommendations. Furnish copies of report for review and record.

## SECTION 15015 – GENERAL REQUIREMENTS

2. Report shall show actual data as recorded. Variations are expected due both to "normal" variations in field readings and to settings deliberately made to achieve proper operating conditions rather than design guidelines. Correct operation and maintained conditions will be sufficient evidence of proper setting.

### 3.05 OPERATING AND MAINTENANCE INSTRUCTIONS

1. This Contractor shall prepare complete sets of bound operating and maintenance instructions including valve chart framed under glass or laminated with clear plastic mounted on masonite board, indicating number, location and purpose of each valve. Two (2) charts and one (1) mylar copy shall be provided for each mechanical room or as designated. The instructions prepared shall be black on white and shall be complete enough so that men generally familiar with the type of system will need no further data to properly perform the indicated procedures.
2. This Contractor shall furnish qualified personnel to instruct the Owner in the operation of the system and must request from the Owner, in writing, a date for such instruction to begin. Contractor's personnel shall remain until such instruction is complete to Owner's satisfaction. Contractor shall receive from Owner written verification that the Owners personnel have been thoroughly instructed in the operation, maintenance and all facets of the system operation.
3. Manuals shall include all equipment, equipment parts lists, complete oiling, recommend spare parts, complete coiling, cleaning and servicing data compiled in a clearly indexed and easily understood form the data shall indicate the serial numbers of each piece of equipment and provide complete lists of replacement parts motor parts ratings and actual loads.
4. Provide operating instructions shall include wiring and control diagrams showing complete lay out of each system.
5. Any special emergency operating instructions and a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to the various parts of the system.
6. ASME and State pressure vessel inspection forms, all motor data, including standard and actual operating in service data and copies of all manufacturer's equipment, guarantees and warranties.

### 3.06 PAINTING AND FINISHING

1. All painting is to be done in accordance to Rust-Oleum Corporations or approved equal printed instructions. All surfaces to receive two (2) coats of primer, exposed surfaces one (1) finished coat. Aluminum or galvanized metal surfaces are considered finished where concealed.
2. All surfaces to be carefully cleaned and/or pickled and filled as required to provide a proper uniform surface. Factory finished equipment shall be touched up or refinished where required.

### 3.07 CONSTRUCTION SAFETY

1. All work shall be done in accordance with the following Federal regulations:
  - A. Williams-Steiger Occupational Safety and Health Standards, Chapter XVII of Title 29, Codes of Federal Regulations.

## SECTION 15015 – GENERAL REQUIREMENTS

2. Comply with local Health and Safety Regulations.

### 3.08 ENERGY CONSERVATION CODES

1. It is the intent of this specification that all equipment and materials furnished meet the latest enforced edition of the Energy Code or such code as locally applicable, if more restrictive.

### 3.09 FLASHINGS

1. All piping passing through roofs shall be provided with Stoneman "Stormtite" seamless lead flashing (or approved equal).

### 3.10 DELIVERY AND STORAGE OF EQUIPMENT

1. This Contractor shall store, take deliveries and install all equipment in accordance with manufacturers requirements. (see general conditions)

### 3.11 STERILIZATION

1. After final testing for leaks, all new potable water lines shall be thoroughly flushed, by plumbing contractor, to remove foreign material. Before placing the system in service, Contractor shall engage a qualified service organization to sterilize the new water lines in accordance with the following procedure:
  - A. Through a ¾" hose connection in the main entering the building, pump in sufficient sodium hypochlorite to produce a free available chlorine residual of not less than 100 ppm.
  - B. Proceed upstream from the point of chlorine application opening all faucets and taps until chlorine is detected. Close faucets and taps when chlorine is evident.
  - C. When chlorinated water has been brought to every faucet and tap with a minimum concentration of 100 ppm chlorine, retain this water in the system for at least two (2) hours.
  - D. At the end of the retention period, no less than 10 ppm of chlorine shall be present at the extreme end of the system.
  - E. Proceed to open all faucets and taps and thoroughly flush all new lines until the chlorine residual in the water is less than 1.0 ppm.
  - F. Obtain representative water samples from the system for analysis by a recognized Bacteriological Laboratory.
  - G. If all samples tested for coliform organisms are negative, a letter and laboratory reports shall be submitted by the service organization to the Contractor, certifying successful completion of the sterilization.
  - H. If any samples tested indicate the presence of coliform organisms, the entire sterilization procedure shall be repeated.

## SECTION 15015 – GENERAL REQUIREMENTS

### 3.12 PLENUM AREAS

1. Any duct plenum area, ceiling or room plenum shall not contain any combustible material, and all insulation, wiring and/or piping shall be suitable and approved by local authorities for plenum installation.

### 3.13 SCHEDULE OF WORK

1. The exact times and dates and schedules that the schools will be available for contractor to do work, shall be as indicated in General Conditions.

### 3.14 CONTINUITY OF SERVICES - EXISTING BUILDINGS

1. The work under the Contract shall not interrupt services to the existing buildings, except if all the following conditions are met:
  - A. Building personnel are notified in advance and approve date and time in writing.
  - B. Interruption of service does not exceed one (1) hour unless otherwise approved.
  - C. Interruption of service does not occur during normal working hours.
2. No "extra" compensation will be permitted due to the overtime" hours implicit in the requirements of this section.
3. Where interruptions will affect life safety and/or other critical systems, proper precautions shall be taken to maintain level of protection or system operation acceptable to Owner and/or authorities having jurisdiction.
4. This Contractor is cautioned that the existing building is to remain occupied during construction and that all services to the building are to be maintained. There shall be no interruption of services and, if absolutely necessary, at least seven (7) days prior notice is required.
5. Any interruption of life safety systems (fire alarm sprinkler) the fire department and alarm company shall be notified, and proper precautions taken.
6. There shall be no obstructing the exit ways from existing building.
7. All interruptions of service shall be done at times which cause least disruption of service.

### 3.15 RELOCATION OF EXISTING EQUIPMENT

1. This Contractor shall be responsible for removal, storage, relocation and installation of all existing equipment shown or scheduled to be relocated. This Contractor will be responsible for capping of all existing services presently feeding existing equipment which is to be relocated and shall patch all surfaces to match existing as required.
2. All patching work shall be done by workmen skilled in this craft and shall in no way affect the stability, finish or operation of the casework or other equipment.

SECTION 15015 – GENERAL REQUIREMENTS

3. All equipment requiring plumbing connections shall be the responsibility of this Contractor. A composite crew shall be used using mechanics skilled in their field.

3.16 PROTECTION OF SERVICES DURING CONSTRUCTION AND DEMOLITION

1. This Contractor shall repair, replace, and maintain in service any utilities, facilities or services (in existing areas where demolition is to occur) which are damaged, broken, or otherwise rendered inoperative during the course of demolition.
2. This Contractor shall effectually protect, at his own expense, such of his work, materials or equipment that may be subject to damage during the construction period.
3. All openings must be securely covered, or otherwise protected.
4. This Contractor shall be held responsible for all damage so done until his work is fully done and finally accepted.
5. It shall be the responsibility of this Contractor to protect existing and new motors, pumps, electrical equipment, plumbing fixtures and all phases of construction.

3.17 EQUIPMENT LIST

1. Refer to General Conditions. Exclusion of items on list does not relieve Contractor of the responsibility from providing equipment as specified, required to complete work as shown on drawings that is to be provided by this Contractor.

M A N U F A C T U R E R

<u>EQUIPMENT</u>	<u>NUMBER 1</u>	<u>NUMBER 2</u>	<u>NUMBER 3</u>	<u>NUMBER 4</u>
Plumbing Fixtures	American Standard	Kohler		Or approved equal
Mop Receptor	Fiat			Or approved equal
Sinks	Elkay	Moen	American Standard	Or approved equal
Valves	Mueller	Stokham	Nibco	Or approved equal
Insulation	Owens/Corning	Johns Manville		Or approved equal
Carriers	Josam	J.R. Smith	Zurn	Or approved equal
Plumbing Specialties	Josam	J.R. Smith	Zurn	Or approved equal
Floor Drains	Josam	J.R. Smith	Zurn	Or approved equal
Lavatory Fittings	Symmons	American Standard	Kohler	Or approved equal
Sink Fittings	American Standard	Symmons		Or approved equal
Sink Fittings	Elkay	American Standard		Or approved equal
Hot Water Heater	Bradford White	Navian		Or approved equal
Water Mixing Valves	Powers			Or approved equal

3.18 UNIT PRICES (See General Conditions)

1. See "General Conditions".

3.19 ALTERNATE BID

1. See "General Conditions". Refer to drawings and specifications for extent of work.

## SECTION 15015 – GENERAL REQUIREMENTS

### 3.20 REPAIR AND PATCHING OF EXISTING SURFACES

- 1 Unless otherwise shown to be done by general contractor, this Contractor shall cut and patch walls, floors, ceilings, roof surfaces and all existing construction for the removal of existing equipment, fixture, piping, controls and other construction for the completion of work under this Contract. All equipment, piping, ductwork, furniture and all construction or materials that are disturbed during construction shall be stored and protected from damage until replaced.
- 2 Cutting shall be done only after shop drawings have been prepared and with the Architect's approval. This Contractor shall exercise proper care and shall not endanger the structure by indiscriminate cutting and shall be responsible for and shall protect all existing construction to remain from damage and shall provide and maintain all necessary temporary protective materials, coverings and barricades.
- 3 This Contractor may hire the other prime contractors to perform this work or hire qualified, independent contractors. This Contractor shall be familiar with and assume all responsibility for any conflicts with union policy and provide supervision in such a manner as not to impede the progress of other trades and be responsible for the adequacy and accuracy of same.
- 4 Wherever previously unfinished areas are exposed by the removal of existing piping or related equipment, these areas shall receive new finishes to blend into the adjoining work.
- 5 Wherever existing chases must be enlarged to encase new work, they shall be enlarged to match the existing.
- 6 Wherever fire rated material must be patched, it shall be patched in a manner not to affect its fire rating.
- 7 All patching work must be done by skilled mechanics in a manner to minimize the patch effect. Wherever new painting is required, it shall be done with at least two coats over new materials.
- 8 The painting must not only cover the area of the actual patch, but also to the nearest natural break of the newly painted surface.
- 9 Wherever the surrounding surface to be painted is in poor condition, all loose paint shall be removed before new paint is applied.
- 10 Patching of existing floor must be done in a manner to assure smooth undersurface and all joints must line up with existing.
- 11 Wherever new vinyl or rubber bases are to be supplied, they shall match adjoining bases in height and color.
- 12 Whenever existing ceilings are disturbed, they shall be replaced with new ceiling tiles or patched to match existing and all services, lights, fixtures, etc. supported temporarily and permanently reinstalled.
- 13 In all spaces in which the contractor is working, he shall protect all existing surfaces.

## SECTION 15015 – GENERAL REQUIREMENTS

14. This Contractor shall remove and replace all ceilings required for his work with the exception of ceilings shown to be removed by general contractor on architectural plans.

### 3.21 REMOVAL

1. This Contractor shall remove existing systems as indicated on drawings.
2. All equipment, cabinets, ductwork, pipe controls, all pipe insulation (except any asbestos insulation), hangers, electric wiring and all construction and appurtenances shall be removed, to complete all work under this contract.
3. Equipment identified by Owner, prior to removal, that is to be retained by the Owner, which is not to be re-installed, shall remain the property of the Owner and shall be removed undamaged and stored in a suitable location where directed by the Architect. This Contractor shall then load, transport and unload equipment from building to site designated by Owner within a twenty (20) mile radius of project.
4. Removed piping, equipment, fixtures, pipe insulation and all debris shall be removed from the building and site in accordance with general conditions.
5. All debris in areas occupied by the building personnel during periods of building operation shall be removed daily.
6. This Contractor shall patch all wall, floors and ceilings and roof surfaces to match existing adjacent surfaces where obsolete equipment, piping, controls and wiring are removed.
7. Work shown on drawings may not indicate all equipment, pipe, etc., nor exact routes, sizes, locations, etc. The drawings are not to be used for estimating detailed take-off for amount of work required, drawings are for reference only. This Contractor shall visit site to determine extent of work and all conditions.

### 3.22 BUILDING ALTERATION WORK

1. This Contractor shall furnish all labor, equipment and materials required to complete alteration work in the building. Remove existing construction and replace, to remove existing equipment and/or install new equipment in conjunction with the work.
2. Cut, patch and paint walls, floors, ceilings, roof surfaces and all construction for the installation of equipment, piping and controls.
3. Cut and patch exterior walls for the installation of air intake and exhaust. Finish to match existing adjacent surfaces.
4. Where existing electrical HVAC or plumbing work, due to removal of existing and/or installation of new equipment, is required to be removed. This contractor shall disconnect existing equipment, cap services in a safe manner, remove equipment, store in a location to prevent damage, replace equipment and patch construction to match existing conditions and reconnect equipment to existing services.

## SECTION 15015 – GENERAL REQUIREMENTS

5. This Contractor shall either retain qualified independent contractors or utilize the other on-site contractors. This Contractor shall assume all requirements for any conflicts with union policy and be responsible for same. This Contractor shall furnish necessary shop drawings and supervision, in such a manner as not to impede the progress of other trades and be responsible for the adequacy and accuracy of same.

### 3.23 CONSTRUCTION SEQUENCING

1. Refer to General Conditions for the overall contract staging. However, specific items for plumbing contractor should be noted. The following are suggested methods of staging of construction. Alternate methods to achieve the intent of these specifications will be allowed; however, they must be coordinated with other trades and submitted for review and approval.
2. The sequence of construction shall be as indicated in the General Conditions of the specifications.
3. Where work is shown on plumbing plans where it is outside the phase areas indicated or specified in the General Conditions, this work shall be done at any time. All work shall be done so not to interfere with normal school operations. Where work is done outside normal school occupied areas (boiler room, roof area), this work may proceed at contractor's option. All work, regardless of the location of work, type of work, or extent of work, shall be done with the approval of the School District.
4. Where work in a particular phase requires work to be done outside that phases' construction boundaries, this Contractor shall locate all new duct, pipe, and equipment to allow for new construction and/or to integrate with existing building construction.
5. All new ductwork and piping shall be installed and coordinated with proposed new work.
6. All work required to be modified due to non-compliance with this section, General Conditions or Construction Sequencing, shall be removed, replaced and/or modified at no additional cost to Owner.
7. Where pipe is shown to serve future phases, provide capped outlet suitable for connection when phase is completed. Provide valves for isolation and draining lines without affecting the work installed in earlier phase.

END OF SECTION  
15015.6140



SECTION 15115 - BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 MATERIALS AND EQUIPMENT

1. All material and equipment used for this contract shall be unused and of the latest model or design available. Equipment shall be installed in strict accordance with manufacturer's recommendations and details.
2. Materials not specifically described but indicated or incidentally required shall be acceptable to the Architect and/or Engineer. Submit shop drawings. Materials shall be delivered, stored and handled so as to preclude injury by weather, dirt or abrasion.
3. This Contractor shall use only specifically assigned areas for storage of materials and construction operation, unless other areas are authorized by the Owner. Such areas will be identified after the award of Contract by Owner. Comply with local municipal regulation regarding use of and parking on public streets.
4. This Contractor shall repair streets, drives, curbs, sidewalks and any existing surface where disturbed by construction operations and leave them in as good condition after completion of the work as before operations started.

1.02 PROTECTION

1. No pipe shall be left open any longer than is required to affix the next piece. If pipe ends are to be left for a protracted period they shall be closed with approved plugs or caps.
2. All equipment shall be covered to protect it from damage; all damage is the responsibility of this Contractor.
3. Any pipe, equipment or construction in existing building shall be done in such a manner to prevent injury to building personnel. Particular care must be taken for any work which will be done during building's normal operation.

1.03 IDENTIFICATION OF PIPING

1. Use color scheme for painting listed in "Scheme for Identification of Piping System", ANSI/ASME A13.1 and Rust-Oleum Corporation Form # 117 Or approved equal. Paint identifying bank of color near each valve and fitting, on both sides of pipes passing through wall, and on long pipe runs approximately every 30' (closer when directed), throughout building. Exposed piping in mechanical rooms and all other areas including insulation, hangers, supports, valves and all appurtenances shall be painted color selected.

Gas Pipe	Yellow (Note: Paint all exposed and rooftop gas pipe.)
Domestic Water	Light Blue
Domestic Hot Water	Orange
Sanitary	Dark Blue
Vent	Blue

2. Stencil on pipe, near each valve, name of pipe contents in abbreviated form, size of pipe, and arrow indicating direction of flow. Place legend in such location that it can be read from floor. Size of stencil letters shall vary with the size of pipe.

## SECTION 15115 - BASIC MATERIALS AND METHODS

3. Seaton "SETMARK" pipe markers or approved equal are acceptable.

### 1.04 TESTING

1. At the completion of all work, and before any covering is applied, all piping except drainage shall be tested hydrostatically at a pressure equal to 150% of the working pressure or to material test pressure, if lower. All piping concealed in any manner shall be tested before being concealed. Maximum drop in pressure permissible shall be two (2) psi in 24 hours.
2. The drainage system shall have openings plugged and be filled with water to the level of the main gutter or top of vent pipes and allowed to stand at least thirty minutes. Each stack may be tested separately.
3. Testing shall be in accordance with ANSI B31.1 in all test gauges, traps and all other apparatus which may be damaged by the test pressure shall be removed or valved off from the system before tests are made.
4. In existing building all required tests on new and/or existing systems shall only be done after normal working hours. All tests done in building shall be done in such a manner as to avoid injury to building personnel and damage to existing and/or new construction. Protect all new and existing construction from damage which may occur as a result of the test or failure of test material.
5. This Contractor shall be responsible for all costs associated with damage to materials or liability due to injury to personnel, as a result of tests or failure of tests.

### 1.05 PRESSURE RATINGS

1. All equipment and materials shall have a working pressure as determined by A.S.M.E. (or similar body), of not less than 125 psi.

### 1.06 SLEEVES

1. All pipes passing through construction shall be fitted with flush sleeves of sufficient diameter to pass the insulation. Sleeves shall be 20 USG galvanized iron, except in masonry, where steel pipe sleeves shall be used. Sleeves in waterproof construction shall be steel pipe, waterproofed with modular mechanical synthetic rubber seals equal to "Link Seals" (Thunderline, or approved equal). In floors they shall extend on inch above the floor.
2. In fire divisions, sleeves shall be constructed of fire-retardant material and shall be installed to maintain the fire integrity of the fire division.
3. All materials and construction methods shall be installed in accordance with the manufacturer recommendations and the requirements of the IBC Code or any other applicable codes.

## PART 2 PRODUCTS

### 2.01 PIPE

1. Steel pipe shall be Schedule 40, electric welded, ASTM-A53, Grade A, plain or galvanized as specified under applicable system.

## SECTION 15115 - BASIC MATERIALS AND METHODS

2. Copper tubing shall be hard temper "Type L" except that all piping underground shall be "Type K", conforming to ASTM-B-88.
3. Cast iron soil pipe shall be extra heavy Bell and Spigot spun type conforming to ASTM-A-74. Standard or medium weights may be used, if permissible under local code.
4. PVC Pipe
  - A. Polyvinyl chloride pipe (PVC) shall be Schedule 40 conforming to ASTM-D-2241.
  - B. Sound rating exposed PVC pipe in finished areas shall have sound rating equal to or less than the sound radiated from cast iron pipe (25-30 DB).
  - C. Where sound ratings are greater, contractor shall install insulation wrap to reduce the radiated sound to less than the sound radiated for cast iron pipe.
  - D. Contractor to install PVC pipe with supports at intervals required by the applicable plumbing code.
  - E. Provide fire listed fire stop devices or collars in accordance with ASTM E814 on both sides of pipe penetrations of fire rated assembly temperature.
  - F. PVC pipe shall not be used where temperatures exceed 140°F.
  - G. All underground pipe to be installed in accordance with ASTM D2321.

### 2.02 PIPE FITTINGS

1. All welded fittings shall be of the same thickness and material as the pipe meeting ASTM-A234. Branch connections shall be made with Weldolets or welding fittings.
2. All flanges shall conform to A.S.A. B-16 using gaskets suitable for the service.
3. Cast iron drainage fittings shall be standard weight galvanized cast iron, banded and recessed.
4. Malleable iron fittings shall be 150 psi wsp conforming to ASTM-A-338.
5. Fittings for copper tubing shall be wrought copper of the solder Type conforming to A.S.A. B16.22.
6. Extra heavy cast iron soil pipe fittings shall conform to ASTM-A-74, all changes in direction being made with "Y" branches or 1/8" (or less) bends.
7. Fittings for polyvinyl chloride (PVC) shall be socket fittings or solvent welded.

### 2.03 BALL, GLOBE AND CHECK VALVES

1. All valves 2" or smaller shall be ball valves; bronze solder end valves in copper tubing and screwed end in other lines. Globe and swing check valves shall be of similar construction with renewable composition disc.

## SECTION 15115 - BASIC MATERIALS AND METHODS

2. All valves 2½" or larger shall be 125 psi WSP, 200 psi WOG bronze mounted, silicon bronze stem, outside screw and yoke, blotted bonnet and follower gland, iron body, flanged end, wedge gate valves. Valves shall be provided with back seat to permit packing under line pressure. Globe and Swing check valves shall be of similar construction with renewable, regrinding, bronze disc and seat.

### 2.04 PLUG AND BALL VALVES

1. Plug and Ball Valves shall be 150 psi WOG with full port. Valves to be lever operated, screwed or solder end in sizes up to 2", flanged end in 2½" to 6" size.

### 2.05 UNIONS

1. Unions shall be installed where needed to facilitate the removal of equipment.
2. Unions 2" and smaller in copper tubing shall be all brass, ground joint, solder end. In other lines, screw end, malleable iron, 125 psi WSP, 300 psi WOG of the ground type.
3. Unions 2½" and larger in copper tubing shall flanged pattern, all brass, solder end. In other lines, 125 psi WPS-175 psi WOG, cast iron flanged pattern, black or galvanized to match piping.

### 2.06 ESCUTCHEON PLATES

1. Where any pipe passes into a finished space, there shall be provided a solid brass, chrome plated, escutcheon plate held to the pipe mechanically or fastened to the building construction.

### 2.07 ANCHORS

1. Anchors of approved design shall be provided where shown or required for the proper control of the stress due to expansion. Anchors shall be heavy metal sections securely fastened to the building construction.

### 2.08 DRIP PANS

1. Provide drip pans for all pipes and equipment carrying liquid or, liquid vapors where pipes pass over areas or electrical equipment. Drip pans shall be constructed of galvanized metal. Provide drain line to closest sanitary line.

### 2.09 ACCESS PANELS

1. Furnish and install access panels not smaller than 18"x18", for access to all concealed valves, and equipment, accessories, etc.
2. Access panels shall be all steel construction with a No. 16-gauge wall or ceiling frame and a 16-gauge wall or ceiling frame and a 14-gauge panel door with not less than 1/8" insulation secured to inside of door.
3. Doors shall have concealed hinges and cylinder lock except doors for wall panels may be secured with suitable clips and countersunk screws.

## SECTION 15115 - BASIC MATERIALS AND METHODS

4. Access panels shall be flush with finished wall or ceiling and shall be painted to match adjacent surfaces. Access panels behind finished surfaces shall have color coded marking on finished surface to indicate location of doors and type of equipment.
5. Access panels in fire rated construction shall be fire rated.

### 2.10 ANCHOR BOLTS

1. Contractor shall furnish and install anchor bolts as required for the equipment. Anchor bolts shall be DECO's standard anchor with floating nut, adjustable ½" in any direction. Grout all bases.

### 2.11 HANGERS

1. All piping shall be supported by hangers, concrete inserts, and insulation saddles conforming to MSS-SP-58.
2. Hangers for cast iron pipe shall be spaced at least one per length, but not more than 7' apart. For steel and copper pipe, pipe shall be spaced not over 8' apart.
3. Vertical runs of pipe shall be supported by riser clamps except that pipe 1¼" and smaller may be braced by galvanized malleable iron fasteners.
4. Hangers for copper tubing shall be copper plated, and completely encircle the tubing. A hanger shall be placed no further than 24" from each change in direction of piping.
5. Hangers shall not be connected to or supported from other pipe, conduit or equipment, but shall be supported from building structure.

## PART 3 EXECUTION

### 3.01 EXCAVATION AND BACKFILL

1. This Contractor shall do all excavating and backfilling necessary and repair finished surfaces that are disturbed. Contractor shall remove or distribute all earth remaining as directed, and/or provide required backfill.
2. Excavate all substances encountered to the depths and sections shown on drawings. Excavation for pipes, manholes, catch basins, drain inlets, and other accessories shall have 12" clearance on all sides.
3. Areas adjacent to any excavation shall be graded to prevent water running in. Excavation shall not be carried below the required level, and if so carried; shall be backfilled with gravel or sand and tap to proper compaction.
4. This Contractor shall do bracing, sheathing, shoring, and pumping necessary for proper completion of the work and for protection of excavations or as required for safety. Temporary bridges or crossings shall be built where required to maintain traffic.

## SECTION 15115 - BASIC MATERIALS AND METHODS

5. After proper inspection and tests all excavation shall be backfilled with approved material, free from large stones, clods or frozen earth, wood and other objectionable material. Contractor shall haul away excess material or provide additional fill as required.
6. Backfill for pipes shall be placed evenly and carefully around and over the pipe in six-inch minimum layers. Each layer shall be thoroughly and carefully rammed by hand until one-foot cover exists over the pipe. The remainder of the backfill shall then be placed, moistened and compacted to a density equal to that of adjacent original materials using mechanical tamping machines.
7. Backfill for sewage ejector and other structures shall be placed symmetrically on all sides in one-foot maximum layers and shall be compacted with mechanical or hand tampers to density equal to 90% of laboratory density in accordance with ASTM-D698 test.
8. Where trenches pass under footings backfill with tamped concrete, 2,500 psi minimum, around steel pipe sleeve.

### 3.02 INSTALLATION OF PIPING

1. All fittings, offsets, etc., may not be shown. Contractor shall determine their necessity by investigating conditions at the site.
2. Contractor shall use shop drawings for exact locations.
3. All piping above ground shall be run parallel with the lines of the building in the most direct manner, concealed in furred spaces where possible.
4. Pipes shall be cut accurately and placed without springing or forcing all burrs removed.
5. All water piping inside the building shall be properly graded to drain ½", hose outlet, angle drain valves.
6. All changes in size of piping shall be made by reducing fittings; no bushing will be permitted unless approved.
7. This Contractor shall determine, with approval, where expansion joints, loops or anchors will be required due to space restrictions prohibiting proper run-out flexibility.
8. Valves, air vents, balancing cocks, etc., shall be placed in accessible positions, and flush metal access doors, (12"x12" minimum size), with necessary lintels, etc., provided where they are concealed.
9. All piping shall be located to prevent freezing. Where pipe is located in areas subject to freezing, provide freeze protection and insulation. Refer to Specification Section 15185.

### 3.03 CLEANING OF GRAVITY SYSTEMS – FINAL CLEANING

1. At completion of project, prior to owner occupancy, this Contractor shall provide a hydro-jet cleaning and a video inspection of the newly installed and existing gravity sanitary systems. The scope of work shall be for all existing and new gravity systems installed in building as indicated in Section 3.03 for initial cleaning.

## SECTION 15115 - BASIC MATERIALS AND METHODS

2. This Contractor is responsible for all work and all cost of work. This contractor shall utilize a certified independent sub-contractor using the latest technology to perform the hydro-jet cleaning and video inspection.
3. Work shall be done so that any debris and blockages encountered shall be removed. Take proper cautions (i.e. screening, etc.) to prevent the debris and material from entering the municipal sewer system.
4. Any blockages due to new construction work which cannot be removed by this hydro-jet cleaning shall be the responsibility of this Contractor to remove. Remove and replace all existing construction, pipe and equipment necessary to access pipe system to clean pipes and clean system to the satisfaction of the Owner, engineer and local authorities having jurisdiction.
5. Any leaks due to new construction and/or renovation work shall be the responsibility of this Contractor to repair to the satisfaction of the Owner, engineer and local authorities having jurisdiction.
6. At the completion provide video with a written test report to Owner.

### 3.04 DRAINAGE PIPING

1. All vent piping may not be shown. This Contractor shall install all vents that may be required by local authorities.
2. All piping shall be so installed that any point in the system can be cleaned by a standard-length snake.
3. It is intended that no horizontal pipe be built into masonry.
4. Vent piping shall be extended full size (minimum 3") above the roof. Offset vents at roof to clear structure.
5. Provide cleanouts at all traps, the bases of all stacks and rain conductors, changes of direction greater than 45 degrees and other points shown on drawings or required by authorities having jurisdiction, on 4" dia. pipe or less, maximum 75' and 5" dia. pipe and larger; 100' maximum. Cleanouts in buried piping shall be brought up flush to finished floors, outside to 18" below finished grade. Cleanout shall be full size for pipe up to 4", and 4" in larger pipes.
6. Exterior cleanouts shall be cast brass raised plug type.
7. Interior cleanouts shall be similar with polished nickel bronze access cover for flush mounting.
8. In concrete floors cleanouts shall be cast brass countersunk plug type with nickel bronze adjustable head and heavy duty scoriated cover.
9. Provide two-way cleanouts at all sanitary laterals at exterior of building.
10. Coordinate locations of all cleanouts with other trades. Relocate or add cleanouts when interferences occur at no additional cost to Owner.

## SECTION 15115 - BASIC MATERIALS AND METHODS

11. Where pipe is installed in previously compacted fill, this Contractor shall be responsible, at no additional cost to Owner, to backfill and compact soil to within tolerances provided by Architect.

### 3.05 JOINING PIPE

1. Steel piping shall be of welded or flanged construction in sizes 2½" and larger; screwed or welded construction in sizes 2" and smaller. All screwed fittings to be cast iron unless otherwise specified. All threads shall be conformity with A.S.A. B-21.
2. All screwed pipe joints shall be made with Teflon Dry Thread Sealer (3M-#48) applied to male threads only.
3. Soldered joints shall be made with non-acid flux and lead-free solder (ASTM 32-60AT). Fluxes shall be used sparingly, and excess wiped from copper.
4. For domestic hot and cold water pipe branches 1½" below, contractor may use Pro-Press system.

### 3.06 JOINING DISSIMILAR METALS

1. Where copper is jointed to steel, joints shall be made by means of brass or bronze adapter in a cast iron fitting or by means of an electrochemically insulated union.
2. Hangers supporting copper tubing shall be copper, or copperized. Copper tubing lines shall not be, even temporarily supported or secured to ferrous metals.

### 3.07 FOUNDATIONS

1. Foundations shall be provided by this contractor for all equipment mounted on concrete floors and shall be of concrete construction not less than 6" high unless otherwise shown.
2. Details of all foundations shall be submitted for approval.
3. Foundations or footings for structural steel supports shall be carried to a point not less than 12 inches below the underside of the floor slab, except where rock is encountered at less depth, then foundation may set on the rock.
4. All foundations shall be built to templates and reinforced as required by the load to be imposed upon them.

### 3.08 STRUCTURAL STEEL

1. This Contractor shall furnish and install all structural steel, supports, braces, hangers, etc., required for his Contract unless shown as being supplied by others.
2. Structural steel shall conform to "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings", of the American Institute of Steel Construction, and where applicable, "Code for Welding Building Construction", of the American Welding Society.



SECTION 15115 - BASIC MATERIALS AND METHODS

3.09 ERECTION AND RIGGING

1. This Contractor shall do all rigging, hoisting and setting-in place of all equipment furnished by him or as shown on drawings or as specified herein.

3.10 NATURAL GAS

1. The gas piping system shall be installed, and final connections made as part of the section titled, "GAS PIPING".
2. Any contractor supplying gas-fired equipment shall leave such equipment complete and ready to operate so that only the final connection of gas piping will be required.

END OF SECTION  
15115.6140



## SECTION 15185 - INSULATION

### PART 1 GENERAL

#### 1.01 SCOPE

1. All surfaces throughout the work shall be insulated with fiberglass insulation as indicated in applicable section.
2. Removal, repair and/or replacement of existing insulation on all existing pipe and equipment due to new work or connection of new work to existing.

#### 1.02 SURFACE TEMPERATURE

1. Where surface temperature can exceed 350° F. substitute calcium silicate insulation.

### PART 2 PRODUCTS

#### 2.01 PIPE INSULATION

1. All piping throughout the work shall be insulated with fiberglass pipe insulation in thickness, indicated in 3.04, of high density and with jacket indicated in the applicable section. (Except that outside thickness shall be doubled.) Vapor barrier jackets shall have self-sealing lap joint, and joints between sections shall be covered with a 4" wide strip to self-sealing vapor barrier materials.
2. Aluminum bands shall be applied, two to a section on all indoor insulation.
3. All pipe exposed in finished areas shall be painted color selected. Where insulation is subject to damage or is located below 7'- 0" AFF, insulation shall have stainless steel jacket with no exposed joints or seams.
4. All insulation shall be "plenum rated".
5. Piping located in pool shall be insulated as indicated above except the thickness shall be 2-1/2" minimum. The insulation shall then be protected with one of the following weatherproof finishes as indicated on contract drawings:

### PART 3 EXECUTION

#### 3.01 INSTALLATION OF PIPE INSULATION

1. All pipe insulation shall be applied over dry, clean surface with joints tightly butted and jacket firmly and securely attached and smoothed. Insulation shall be continuous through wall, floor or ceiling openings and sleeves.
2. All valve bodies and fittings shall be insulated with preformed fittings of thickness equivalent to adjacent insulation and jacketed with same material. At Contractor's option, except in plenums, outdoors and where not permitted by code; provide precut fiberglass insulation blanket of same insulation thickness as adjacent insulation with a preformed snap on type molded PVC jacket, cover edges with vapor barrier adhesive or vapor barrier tape.

SECTION 15185 - INSULATION

3. Provide metal shields under all hangers or pipe supports on outside of insulation; on roller supports provide pipe shoe cavity with insulation. Provide insert between support shield and piping on piping 1 1/2" dia. and larger. Insulation inserts shall be heavy duty insulation material length 12" up to 6" dia. pipe 16" long on 8" & 10" pipe, and 22" long on 12" pipe and larger. **HANGERS SHALL NOT PENETRATE PIPE INSULATION.**
4. On outdoor insulation, double insulation thickness, provide metal jacket; and prefabricated, removable and replaceable metal jacket at fitting and valves.
5. Locate insulation and cover seams in least visible locations, neatly finish insulation at supports, protrusions and interruptions.

3.02 EQUIPMENT INSULATION

1. All equipment containing fluids whose piping is specified to be insulated or whose surface temperatures will be low enough to cause condensation (60° F.), or high enough to burn persons touching same (110°F.), shall be insulated with a minimum of 1 1/2" thick fiberglass block firmly butted and wired in place, and covered with 1/2" thick coat of insulating cement troweled over one inch galvanized hexagonal wire mesh and finished cement troweled smooth. Metal corners beads shall be applied to protect corners.

3.03 INSULATION THICKNESS

1. Minimum pipe insulation thickness shall be in accordance with the ASHRAE 90.1-2007, local requirements, or the following table:

PIPING SYSTEM CLASSIFICATION	FLUID TEMP. RANGE,F.	INSULATION THICKNESS IN INCHES FOR PIPE SIZES		
		1"and LESS	1-1/4 to 2	2-1/4 to 4 and over
Domestic Hot Water Supply and Return	120-200	1"	1"	1"
Domestic Cold Water	40-60	1"	1"	1"

2. Where piping runs outdoors, double insulation thickness.
3. This Contractor shall provide heat tape (electric) to prevent freezing of outdoor piping and all other piping subject to freezing. Electric heat tape to be Chromalox Type M1 cable, furnished with all controls, power wiring and appurtenances. Size and capacity per manufacturers' requirements.

END OF SECTION  
15185.6140

## SECTION 15410 - WATER SUPPLY SYSTEMS (INTERIOR)

### PART 1 GENERAL

#### 1.01 SCOPE

1. The work under this heading shall include furnishing and installation of:
  - A. All domestic water piping, insulation, plumbing material and specialties required for the proper functioning of the work. Connections to all equipment requiring domestic water connections whether furnished under this section or not. Sloped piping and valves to permit drainage of entire system.
  - B. Connection to, modifications, extension, replacement, and/or removal of existing system and equipment for new work.

### PART 2 PRODUCTS

#### 2.01 PIPING MATERIAL

1. Water Services - Copper Tubing Type "L", Type "K" underground. All exposed piping under and adjacent to fixtures shall be chrome plated brass pipe. All pipe shall have lead-free solder.

#### 2.02 HOT WATER RECIRCULATION PUMP

1. Hot water recirculating pumps shall be centrifugal pumps especially designed for domestic water service, B&G model, 1" dia. flange size, bronze fitted.
2. Provide B&G timer Model 113210 (or approved equal) and B&G aquastat Model AQS-1/2 (3/4) (or approved equal) to de-energize pump for all recirculation pumps. Pump shall have check valve and shutoff valve on pump discharge and shutoff valve on pump suction, all valves same size as recirculation line.

#### 2.03 STORAGE WATER HEATER EXPANSION TANK

1. Provide expansion tank on domestic hot water heaters where required and where heaters are installed with check valve on cold water and/or on installations with backflow preventers on main water service.
2. Expansion tank to be installed on cold water inlet to storage heater.
3. Tank shall be equipped with air inlet and water drain off and shall be diaphragm type tanks (Amtrol Therm-X-Trol Model ST or approved equal), where required provide ASME tanks.
4. Minimum tank volume shall either be as required by Amtrol Form ST-8-89 or .11 gallons expansion tank per gallon of storage tank capacity, whichever is greater. Volumes based on 140°F. water temperature, for higher temperatures adjust volumes accordingly.

#### 2.04 MIXING VALVES

1. Powers HI-Lo supply fixture tempering valve thermostatically controlled, sized for 10 psi pressure drop at maximum flow.

## SECTION 15410 - WATER SUPPLY SYSTEMS (INTERIOR)

2. Valve shall have balancing and check valves and pipe looping where required to prevent thermal migration of hot water to cold water.

### 2.05 STORAGE WATER HEATER

1. Furnish and install domestic hot water heaters as shown on plans. Heaters shall have pressure temperature relief valve piped to receptor. Insulate in accordance with ASHRAE-90 requirements.
2. Ceiling mounted units shall have auxiliary sheet metal drain pan under units with drain to floor or closest sanitary line. Where located above fixtures, provide vacuum breaker.
3. Fuel fired units shall have breeching and flues as required and as specified in Section 15860.
4. Provide emergency shutoff switches with all wiring per code.
5. Provide emergency drain pan under all units.

## PART 3 EXECUTION

### 3.01 INSULATION

1. See Section titled "INSULATION".
2. Domestic Cold Water, Hot Water and Hot Water Recirculating Line - Fiberglass with all service jacket.

### 3.02 STERILIZATION

1. After the tests have been completed, and before the system is put into operation, the entire water system shall be sterilized as required in Section 15015.

### 3.03 CONTROLS

1. Provide all controls, wiring and sensors between units (per manufacturers' requirements).
2. Provide all control, wiring, sensors and appurtenances for system to allow for temperature controller in storage tank to control pump and hot water heater.
3. Provide all sensors in tanks' auxiliary connections at hot water heaters for interface to the control system.
4. The interface shall have termination points to allow for connection of controls to the pumps, storage tank and heaters. Where there is a cascade control system provided by the heater manufacturer, the system shall have auxiliary contacts.
5. Provide monitoring and control for all new gas hot water heaters.

## SECTION 15410 - WATER SUPPLY SYSTEMS (INTERIOR)

- A. Tank temperature indication.
- B. Transfer pump on/off indicator.
- C. Heater on/off indicator.
- D. Heater alarm condition.

### 3.04 BALANCE COCKS AND RECIRCULATION SYSTEM

- 1. Balancing plug valves shall be installed in each branch of the recirculating system. Install thermometer in each branch of recirculating system near plug valve to facilitate balancing.

### 3.05 EXPOSED LINES

- 1. All domestic water pipe in finished areas shall be concealed in drywall and/or concrete block walls. Where installed in concrete block walls, pipe to be installed within cores and done without cutting block. Where it is not possible to locate in wall without removing block, this Contractor shall coordinate with general contractor location and sizes required. This Contractor shall cut and repair block. Finishing of block shall be suitable for painting.
- 2. Where is determined by construction manager and/or architects that pipe must be exposed in finished area, it shall be enclosed in sheet metal chase constructed per architectural details by this Contractor.
- 3. No pipe shall be allowed in finished areas, except where specifically indicated (backflow preventers, etc.) Pipe shall be insulated and protected per Specification Section 15185. Exposed pipe runouts to fixtures shall be chrome plated.

END OF SECTION  
15410.6140





## SECTION 15420 - SOIL AND WASTE SYSTEM

### PART 1 GENERAL

#### 1.01 SCOPE

1. The work under this heading shall include the furnishing and installation of:
  - A. All soil, waste and vent piping, including connections to sewers. All materials and specialties required for the proper functioning of the work. Connections to all equipment requiring soil, waste or vent connections whether furnished by this Contractor or not.
  - B. Connection to, modification, extension, replacement, and/or removal of existing system and equipment required for new work.

### PART 2 PRODUCTS

#### 2.01 PIPING MATERIALS

1. Drainage Systems - Cast iron soil pipe. Galvanized steel, copper tube, etc., may be acceptable if locally approved.
2. Provide separate cost for PVC where permitted and in locations approved by local code.

#### 2.02 JOINTS

1. Neoprene gasket joints may be acceptable if locally approved.
2. "No Hub" pipe, fitting and joint material may be acceptable if locally approved.

### PART 3 EXECUTION

#### 3.01 MINIMUM COVER FOR EXTERIOR LINES

1. Soil Lines – 3'-0"

#### 3.02 PIPE INSTALLATION

1. Provide minimum slope of 1/8" per foot or as required by local code. Install cleanouts at lower ends of stacks, at each change of direction, where indicated, or required by local code. Support cast iron pipe risers at base of stack and at hubs.
2. Offset vent lines through roof to obtain minimum visibility from front of the building. Extend vents a minimum of 2' above roof line.
3. Flash vents passing through roof. Extend flashing vertically up pipe and turn down into bore 2" or terminate in special flashing collar. See Section titled "General Requirements - Flashings".

SECTION 15420 - SOIL AND WASTE SYSTEM

3.03 PROHIBITED USE OF PVC

1. No combustible material (PVC or ABS pipe, etc.) shall be installed in any return or supply air plenum area, in fire rated roof, ceiling and/or floor assemblies.

END OF SECTION  
15420.6140

## SECTION 15430 - ROOF DRAINAGE SYSTEM

### PART 1 GENERAL

#### 1.01 SCOPE

1. The work under this heading shall include the furnishing and installation of:
  - A. All rainwater piping except sheet metal rain leaders including connections to sewers. All materials and specialties required for the proper functioning of the work. Connections to all equipment requiring rainwater connections whether furnished by this Section or not.
  - B. Except where indicated on plans, all interior storm drains underground shall extend to 5' +/- outside of building. This contractor shall provide method for connection of site storm drainage.
  - C. This Contractor shall verify all invert elevations of existing storm lines.
  - D. Removal, modification and connection to existing roof drainage system under new addition.

### PART 2 PRODUCTS

#### 2.01 PIPING MATERIALS

1. Drainage Systems – All underground storm pipe up to 8" dia. and all above ground storm pipe, except where indicated on plans and/or in plenum, shall be PVC. Cast iron soil pipe shall be used for all pipe 10" dia. and above where exposed.

#### 2.02 ROOF DRAINS

1. Cast iron roof drains with large sump, removable metal large dome and flashing clamp integral with gravel stops; with deck clamp and receivers where required.
2. Drains to be Josam 21500 Series with expansion joints Josam 26200 or approved equal at each roof drain.
3. Provide overflow pipe where required by local code.

### PART 3 EXECUTION

#### 3.01 MINIMUM COVER FOR EXTERIOR LINES

1. Rainwater - 2'- 6"

#### 3.02 INSULATION

1. Rainwater Conductors – ½" thick with all Service Jacket on horizontal lines only.
2. For pipe above or within noise sensitive areas, all pipe (horizontal and vertical including bottom roof drain pan) shall have 2" thick insulation.

SECTION 15430 - ROOF DRAINAGE SYSTEM

3.03 FLASHINGS

1. All roof drains shall be flashed and counter flashed in such a way as to permit Roofer to bond roof (whether specified or not) for 20 years.

END OF SECTION  
15430.6140

## SECTION 15440 - GAS PIPING SYSTEM

### PART 1 GENERAL

#### 1.01 SCOPE

1. The work under this heading shall include the furnishing and installation of:
  - A. All gas piping including all materials and specialties required for the proper functioning of the work. Connections to all equipment requiring gas connections whether furnished by this Section or not.
  - B. Gas service in accordance with local regulations including meter pits if required or shown.
  - C. Connection to, modification, extension, replacement, and/or removal of existing system and equipment as required for new work.

### PART 2 PRODUCTS

#### 2.01 PIPING MATERIALS

1. Steel pipe with malleable iron fittings unless otherwise required by local authorities. All underground piping shall be coated in accordance with the recommendations of the local utility. Use approved connectors and/or connection details for all equipment. All pipe above 2" dia. Shall be welded.
2. All gas pipe shall be painted "yellow" including but not limited to pipe on roof and above ceilings.
3. Label all gas pipes with "GAS – Gas Pressure".

### PART 3 EXECUTION

#### 3.01 PIPE INSTALLATION

1. All gas piping shall be installed in accordance with the International Fuel Gas Code, NFPA-54 and the recommendations of the local utility including coating, ventilation and/or protection.
2. All gas pipe shall be painted "yellow" including but not limited to pipe on roof and above ceilings.
3. Label all gas pipes with "GAS - Gas Pressure".

#### 3.02 CONNECTIONS TO EQUIPMENT

1. All connections to equipment shall have shut offs and drip legs and shall be in accordance with equipment manufacturer's requirements. All shutoff valves shall have 1/8" NPT plugged tapping for pressure testing. Verify final location and type of connection in field.
2. All connections to movable equipment shall have flexible connections, quick disconnects. All kitchen equipment shall have stainless steel flexible connections.

## SECTION 15440 - GAS PIPING SYSTEM

### 3.03 GAS SERVICE AND METERS

1. Coordinate all requirements for metering with local gas company. All new meters are to be installed in accordance with gas company's requirements.
2. The size and capacity of the new gas service and meter to be coordinated with gas
3. Provide a label at service entrance - Natural Gas - CAS-74-82-8 with indication of gas pressure.

### 3.04 EXPANSION LOOPS

1. Provide expansion loops for all rooftop mounted pipe.

### 3.05 ROOFTOP PIPE

1. Provide roof supports per details on architectural plans and/or gas company requirements. Provide expansion loops.

### 3.06 COMBUSTION AIR

1. All-natural gas-fired appliances located indoors shall have adequate provisions for combustion air. All combustion air installations shall be installed per NFPA-54/ANSI-Z-223.1, National Fuel Gas Code Latest Edition, and per local gas company requirements.

### 3.07 GAS PRESSURE

1. All gas-fired equipment furnished under this Contract shall be rated to operate at minimum 5.0" w.c. gas operating pressure, unless otherwise noted.
2. Prior to installation of gas pipe, this Contractor shall verify the pressure requirement of all gas-fired equipment furnished under this Contract or under other Contracts
3. Where gas pressure exceeds 6.0" WC or where high pressure in excess of 14" WC is utilized, provide pressure regulators in all gas lines where appliances are not rated for higher gas pressure. Pressure regulators shall be sized and installed per manufacturers' requirement. All regulators installed indoors shall be vented outdoors.

END OF SECTION  
15440.6140

## SECTION 15450 - PLUMBING FIXTURES AND EQUIPMENT

### PART 1 GENERAL

#### 1.01 SCOPE

1. Furnish and install complete with all necessary trim, hangers, etc., all plumbing fixtures and equipment required for the Contract.
2. All handicapped fixtures shall be installed per American Disabilities Act (ADA) and applicable guidelines.
3. Install all fixtures at heights indicated on architectural plans.
4. Provide all offset piping and special tail pieces per manufacturer requirements to comply with clearances per ADA.
5. Adjust heights of carriers due to depressed floors in toilet rooms.
6. All fixtures, equipment and appurtenances where manufacturer and manufacturers' model numbers are specified shall be "or equal".

### PART 2 PRODUCTS

#### 2.01 P-1 - WATER CLOSETS

1. American Standard "Afwall", (or approved equal) elongated rim, wall mounted bowl, siphon jet with 1½" diameter top spud. Aquameter 2257.103 with Sloan #8111 (or approved equal) battery powered sensor operated flush valve, 1.5 gal./flush. Note: Flush valve requires 25 psi minimum working pressure.

#### 2.02 P-2 - HANDICAPPED WATER CLOSETS

1. Wall mounted fixtures to be mounted so that height of water closet shall be 17" to 19" above finished floor to top of seat.
2. Seats shall not be sprung to return to a lifted position.
3. Flush valves and controls shall be installed in accordance with ADA guidelines Section 4.16.5 and 4.27.4.

#### 2.03 CLOSET SEATS

1. Heavy duty, open front, cut out back, seat no cover, stainless steel check hinge, solid section, high impact polystyrene white seats.
2. Handicapped Applications - Provide seat cover where required to meet requirements of ADA, Section 4.16.5 and 4.27.4.

## SECTION 15450 - PLUMBING FIXTURES AND EQUIPMENT

### 2.04 URINALS

1. **P-3** - American Standard "Lynnbrook" 6601.012, (or approved equal) vitreous china blowout urinal, wall hung, 1¼" top spud with Sloan #8180-1 battery powered sensor operated flush valve, 1.0 gallon/flush.
2. **P-4** - Handicapped - Mount as required for handicapped. For battery operated flush valves, use Sloan 8180-1.0 BD (beam deflector) (or approved equal).

### 2.05 WALL HUNG LAVATORIES

1. **P-5** - American-Standard "Lucerne", 20"x18" (or approved equal), vitreous china wall hung lavatory for concealed arms.
2. **P-6** - Handicapped Applications - Mount unit as required to maintain clearances per local codes.
3. All 20"x18" wall hung china lavatories shall be furnished with "TRUEBRO, INC. LAV SHIELD protective enclosure, Model #2018-AS-L1 or approved equal. Lav Shield shall be constructed of rigid high-impact, stain-resistant PVC, 0.093" nominal wall thickness, shall have UV protection and shall be furnished and installed with seven (7) virtually indestructible – tamper resistant stainless screws with wall anchors. Color shall be china white. Lav Shield shall fit all ADA-conforming 20"x 18" wall hung china lavatories. Lavatories shall paintable with acrylic enamel or latex paint. Lav Shield shall be UL listed in accordance with ADA Article 4.19.4 Flammability ratings; UL-94 V-0, 5VA ASTM D-635-91 4 (ATB) 2.1 (AEB). Lav Shield shall be listed for bacteria/fungus resistance per ASTM G21 and G22 – Result 0 growth.

### 2.06 LAVATORY TRIM

1. **P-5** – Sloan Model EAF350 (or approved equal) battery powered hand washing faucet, sensor operated faucet with below deck Model 170LF (or approved equal) thermostatic lead-free mixing valve and faucet and brass grid strainer.
2. **P-6** - "Handicapped Installation" - Insulate all water and drain pipes exposed below sink.

### 2.07 SUPPLIES, TRAPS, CARRIERS, ETC.

1. Provide chrome plated supplies with screw driver stops for all fixtures.
2. Provide traps, deep seal where required, for all fixtures, chrome plated where exposed.
3. Provide Josam (or approved equal) carriers for all wall hung fixtures. All bases, where required, to be block type. with 4"x3" reducing bushings fabricated steel cabinet with flow control and fresh air inlet.
4. Carriers for lavatories shall be Josam Series 17720 (or approved equal) floor mounted heavy duty with hanger plate adjustable supporting rods structural upright welded feet.
5. Carriers for water closet shall be Josam Series with special duty high 750# carrier.



## SECTION 15450 - PLUMBING FIXTURES AND EQUIPMENT

### 2.08 P-7 - MOP SERVICE BASINS

1. Fiat molded stone mop service basin with #830-A supply fitting and #889CC mop hanger (or approved equal).

### 2.09 P-8 - 3-COMPARTMENT SINK

1. Tabco Model 9-3-54-18FL (or approved equal) with drainboard, Model K11 faucet and (3) K15 lever waste handles.

### 2.10 P-15 - HAND SINK

1. Wall mounted stainless steel Tabco Model 7-PS-50 (or approved equal) with 7-PS-10 drain, K124 faucets and basket strainer.

### 2.11 FLOOR DRAINS

1. **P-9** - Finished Spaces - Josam 30000-S (or approved equal) with square nickaloy strainer of recommended size.
  - A. Floor drains installed in tiled floors shall be Josam 30000A (or approved equal) with square nickaloy strainer of recommended size and installed and coordinated with tile layout, so drains are located within the tile pattern in a manner to minimize cutting of tile.
2. **P-10** - Equipment Rooms - Josam 32320 (or approved equal) with sediment bucket with square nickaloy strainer of recommended size.
3. **P-11** - Indirect Waste - Josam 3000-EI (or approved equal) with nickaloy adjustable extended rim strainer.
4. **P-12** - Kitchen - Josam 49280-31 (or approved equal) with nickaloy rim and top and deep aluminum sediment bucket with acid resisting enamel interior.
5. Provide deep seal traps and JR Smith Quad Seal or approved equal.

### 2.12 SHOCK ABSORBERS

1. Josam 75000 Series (or approved equal) in size recommended by P.D.I. on each group of fixtures.
2. Install in chase above ceiling with access panel or install where accessible for service.

### 2.13 SAFEWASTE DRAINS

1. At all safewaste drains, provided trap and funnel and trap primer JR Smith 2699 (or approved equal) on closest water line with ½" dia. cold water to safewaste.

## SECTION 15450 - PLUMBING FIXTURES AND EQUIPMENT

### 2.14 INTERIOR GREASE INTERCEPTOR

1. Grease interceptor shall be constructed of either cast iron or steel with heavy duty white coating. Unit shall be on floor type or partially recessed as required by field conditions or as indicated on plans.
2. Unit shall have cascade bottom, internal air relief, visible double wall trap, removable baffles, gasketed removable cover, grease draw off piping, draw off valve, flexible hose and shut-off valve. Flow control, cleanout and fresh air intake on inlet.
3. Unit size and capacity shall be as required by manufacturer based on equipment drained, maximum drainage period of 90 seconds.
4. Units shall be rated by and bear the seal of approval from PDI. Type of pipe connections to be coordinated with type of piping used in kitchen. Contractor to verify the size and location of interceptor with Kitchen Equipment Contractor and all other trades.
5. Dishwasher and/or garbage disposal shall not be connected to grease traps.
6. Grease interceptor Josam semi-automatic Model 60105 SA-RT (or approved equal) with flexible hose discharge shutoff valve. Provide pit to allow for access to shutoff valve and interceptor.

### 2.15 P-13 – UTILITY SINK

1. Fiat Model FL-1 (or approved equal) molded stone, 24"x24" with legs, faucet with vacuum breaker and threaded connection.

### 2.16 P-14 – DRINKING FOUNTAIN

1. Halsey Taylor Model HRF-SEBP (or approved equal), contour bi-level, non-filtered, non-refrigerated, stainless steel.

## PART 3 EXECUTION

### 3.01 INSTALLATION

1. All fixtures shall be installed after finished surfaces are complete; they shall be set neat and flush without damage to adjacent surface.
2. All equipment shall be installed in a neat workmanlike manner.
3. All floor mounted fixtures to be set on silicone caulking as further waterproofing.

END OF SECTION  
15450.6140

## SECTION 16100 - GENERAL ELECTRICAL

### 1. GENERAL PROVISIONS

- 1.1 The applicable provisions of the Division 1 General Conditions, Supplemental Conditions, Special Contract Requirements, Amendments and Additions to the General Conditions, and all project addenda are hereby made an integral part of this section.
- 1.2 These specifications apply to all electrical work performed.
- 1.3 When apparent conflict exists between these specifications and the contract drawings, within the specifications, or within the drawings, the engineer will determine the intent.
- 1.4 The term "provide" means "furnish and install". The terms "contractor", "E.C.", and "EC" mean "electrical contractor", unless otherwise noted. All work indicated in specifications division 16000 and on the electrical drawings is by the electrical contractor, unless otherwise noted.
- 1.5 The terms "unless otherwise noted" or "unless otherwise indicated" in any form of wording mean "unless specifically indicated otherwise on the electrical drawings, in the electrical specifications, or in the General Conditions and Requirements to the specifications and/or contract". These terms do not mean "unless indicated otherwise on the general construction, mechanical construction, or other disciplines' drawings or specifications", except where specifically so worded on the electrical drawings or electrical specifications.
- 1.6 Materials and equipment manufacturers and catalog numbers specified constitute the type and quality of design, material, workmanship, ruggedness of construction, resistance to vandalism, exact operating and performance characteristics, features, configuration, dimensions, etc.. Where multiple manufacturers are shown in the drawings and/or specifications, not all manufacturers shown may be capable of providing materials and equipment meeting the specifications, field conditions, etc.. Manufacturers not specifically shown on the drawings or specifications shall be considered, provided the products are equivalent or superior to the requirements of the drawings and specifications (including equivalent or superior to products and/or manufacturers specifically shown on drawings and specifications). Manufacturers, whether shown on the drawings or specifications or not, are acceptable only if they can meet the specifications, conditions, and requirements specific to this project. The terms "equivalent", "equal", "equaling", and "approved equal" mean "equivalent or superior to the item/process specified when approved by the engineer", unless otherwise noted.
- 1.7 For any equipment indicated on the drawings or specifications as furnished by the owner (or furnished by any other party, including other contractors, subcontractors, or third parties), contact the furnishing party prior to submitting bid to obtain all requirements of such equipment as necessary to provide a complete installation. Provide all ancillary equipment as necessary which is not furnished but which is required for a complete installation of owner furnished equipment.

### 2. SCOPE OF WORK

- 2.1 The work governed by these specifications consists of providing all labor, materials, equipment, services, and related items/work necessary to complete all the electrical work as indicated and described in the drawings and specifications.

## SECTION 16100 - GENERAL ELECTRICAL

2.2 Electrical work includes but is not limited to:

- A. Electric service and service equipment
- B. Power distribution and wiring
- C. Interior and exterior lighting
- D. Emergency power and lighting
- E. Utilization equipment connections
- F. Fire alarm system
- G. Telephone raceway/pathway system
- H. Temporary power and lighting

### 3. CONTRACT DRAWINGS AND SPECIFICATIONS

- 3.1 Drawings are diagrammatic and indicate the general arrangement of the various systems and approximate and relative locations of the materials and equipment defined by the specifications. Coordinate with and obtain the approval of the owner, architect, and engineer for the exact locations of all materials and equipment. Check the drawings, specifications, and all fabrication and shop drawings (including fabrication and shop drawings of other trades) to verify space conditions, headroom requirements, characteristics, and for coordination. Where space conditions and headroom requirements appear inadequate, notify the engineer before submitting a bid. No extra consideration, claims, charges, or compensation will be granted under any circumstance for failure to notify the engineer, or for any alleged misunderstanding of the requirements above. Completely furnish, install, connect, and interconnect all components of all systems in accordance with contract requirements, manufacturer's instructions, applicable codes and standards, and best practices of the trade.
- 3.2 Minor deviations, variations, changes, and corrections from layouts shown on the drawings (based on coordination, conditions, manufacturer's instructions, codes and standards, shop drawings, and verification of measurements and conditions) are permitted to facilitate construction provided the changes do not represent potential changes in scope of work (see the section of these specifications "Changes to the Scope of Work") and provided the changes are acceptable to the owner, architect, and engineer.
- 3.3 Before submitting bid, examine and check all drawings and specifications relating to all work, including electrical, mechanical, plumbing, general construction, fire protection, and any other trades' drawings and specifications (as well as Division 1 General Conditions) and become fully informed as to the extent and character of work required and its relation to the work of other trades. No extra consideration, claims, charges, or compensation will be granted under any circumstance for any alleged misunderstanding of the work to be performed, or the force and intent of these specifications.
- 3.4 Fully coordinate (prior to releasing doors and hardware) with the general contractor to ensure that all doors to rooms housing new large electrical equipment swing open in the direction of egress and are equipped with proper "panic" hardware (as per NEC Articles 110.26(C)(3) and 110.33(A)(3), where applicable).

### 4. VISIT TO SITE

- 4.1 Before estimating work, visit the project site and verify all measurements and field conditions affecting the work. The contractor is fully responsible for the correctness of all

## SECTION 16100 - GENERAL ELECTRICAL

measurements and for any connections to existing work. Submission of bid is considered evidence that this contractor has visited and examined the site. No extra consideration, claims, charges, or compensation will be granted under any circumstance for extra work as a result of the contractor's failure to visit the site or verify conditions and measurements.

### 5. VERIFICATION OF MEASUREMENTS AND CONDITIONS

- 5.1 The electrical contractor is solely responsible for verifying field measurements, conditions, and drawing and specifications information (for all trades) before ordering materials and equipment and before commencing work. The electrical contractor is solely responsible for verifying shop drawings (including shop drawings of other trades) before releasing related materials and equipment and before rough in. No extra consideration, claims, charges, or compensation will be granted under any circumstance due to any differences between the actual dimensions and any dimensions indicated on the drawings.
- 5.2 Report any apparent discrepancies or conflicts found at once to the engineer for consideration and wait for a decision before proceeding with any work in the affected area.
- 5.3 The engineer's decisions in cases of discrepancies, conflicts, and related to verification of measurements and conditions are final and binding upon the contractor, make all installation accordingly.

### 6. EXISTING CONDITIONS AND UTILITIES

- 6.1 Information and data indicated on the drawings regarding existing conditions (including underground utilities) is from the best available sources. However, no assurance is made as to completeness and/or accuracy.
- 6.2 Contact all utility companies operating in the project vicinity (water, gas, sewage, electric, telephone, cable television, etc.) and the owner's maintenance department (where applicable) and verify all existing underground systems before any excavation commences. Utilize applicable "one-call" or "before you dig" utilities marking services, including paying all associated fees.
- 6.3 Relocate any existing underground electrical feeders and wiring in areas of construction and around proposed foundations as applicable. Include all costs in bid. If any third-party owned wiring or equipment interferes with construction, notify the engineer.

### 7. ITEMS NOT SHOWN OR SPECIFIED

- 7.1 Provide any items of material not indicated on the drawings and/or not specified, but which are required for the complete and proper installation and/or operation of any part of the work, as if indicated and specified.
- 7.2 Provide any work not indicated on the drawings and/or not specified, but which is required for compliance with applicable codes and regulations, as if indicated and specified.
- 7.3 No extra consideration, claims, charges, or compensation will be granted under any circumstance for performing work required for complete and proper installation/operation or required for compliance with applicable codes and regulations.

## SECTION 16100 - GENERAL ELECTRICAL

### 8. REGULATIONS AND CODES

- 8.1 Perform work in accordance with all respective requirements of the latest adopted editions (as of the date of electrical construction permit approval) of all applicable federal, state, and local codes, standards, regulations, ordinances, laws, etc. and industry standards. This includes applicable requirements of the National Electrical Code (NEC), National Fire Protection Association (NFPA), American National Standards Institute (ANSI), Americans with Disabilities Act (ADA) (as well as all related state disabled access and/or barrier free codes and standards and ANSI A117.1), International Building Code (IBC), International Energy Conservation Code (IECC), International Residential Code (IRC), Factory Mutual (FM), Illuminating Engineering Society of North America (IES, IESNA), Institute of Electrical and Electronic Engineers (IEEE), Insulated Power Cable Engineer's Association, National Electrical Contractors' Association (NECA) "Standard of Installation", National Electrical Manufacturer's Association (NEMA), National Electrical Safety Code (N.E.S.C.), Underwriter's Laboratories (UL), United States Department of Labor Occupational Safety and Health Administration (OSHA), utility companies requirements, etc..
- 8.2 Where listing or labeling (in any form, i.e. UL, CSA, ETL, etc.) is indicated in the drawings or specifications or is otherwise required by the NEC or other applicable code, provide equipment and materials as either listed or labeled by a qualified product evaluating organization (UL, CSA, ETL, or approved equal) acceptable to local authorities having jurisdiction. Include all costs in bid. No extra consideration, claims, charges, or compensation will be granted under any circumstance associated with providing listed equipment.
- A. The electrical contractor is fully responsible for verifying (before submitting bid) the applicability and extent of code required listing with local authorities. Specifically verify if the municipality has any requirements that "listable" (capable of being listed) products must be "listed". Provide accordingly where applicable.
- B. Submission and/or approval of shop drawings (which may or may not show listing) do not relieve the contractor of the responsibility to meet listing requirements.
- C. Where products required (by specifications/code) as listed are installed without listing or as non-listed (without prior written approval), the contractor shall remove the products and install listed products at no cost to the owner. Written approval will only be considered if all of the following are satisfied:
- 1) The contractor is fully responsible for (including all costs) and must prepare and submit any and all information necessary for review and evaluation of products (by the authority having jurisdiction, engineer, architect, and owner). This includes all processing costs for all parties involved and costs for any special or independent third party inspections, investigations, evaluations, engineering services (including sealing by a registered professional engineer), etc. which may be required or requested in conjunction with approval. In the absence of listing, the contractor is fully responsible for proving that products are acceptable.

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- 2) The contractor must show one (1) or more of the following:
    - a) That listed products are not available.
    - b) That providing available listed products involves excessive costs or hardships.
    - c) That listing of products involves requirements that unreasonably exceed the requirements of the specifications, codes, and project conditions.
  - 3) Products must meet or exceed all specified requirements, industry standards, code requirements, and conditions specific to the project.
  - 4) There must be no change in contract price (except that the owner reserves the right to require credit pricing).
  - 5) Where acceptable to the owner.
- 8.3 Where NEC article numbers are referenced in the drawings and specifications, they apply to the latest edition. Where the authority having jurisdiction has not adopted the latest edition, refer to the corresponding applicable code requirement article.
9. PERMITS, CERTIFICATES, AND FEES
- 9.1 Apply for, obtain, pick-up, and pay for (pay all costs associate with) all permits, licenses, certificates, etc., required for execution of the project. Procure all permits immediately upon notice to proceed with the contract. The contractor is fully responsible for verifying all permits, licenses, certificates, etc. which are required. Submit (see the section of these specifications "Summary of Submissions") copies of all permits, licenses, certificates, etc. in conjunction with this project for record. Prepare all information and data for submittal to any authority in order to obtain permits and certification of compliance for the permits. This specifically includes this contractor reproducing contract drawings for permit submission, which shall be sealed by the electrical engineer upon request.
- 9.2 Obtain and submit (see the section of these specifications "Summary of Submissions") six (6) copies of inspection certificate(s) from authorities having jurisdiction indicating approval of the electrical installation. Arrange and pay for all electrical inspections (performed by an approved Underwriters Inspection Agency) associated with inspection certificate(s).
- 9.3 Applicable utility service charges will be paid directly by the owner. Obtain and submit (see the section of these specifications "Summary of Submissions") written estimates from all respective utility companies prior to utilities performing work.
- 9.4 If and when requested by the owner or owner's representative, the electrical contractor shall submit to the owner any information necessary as part of the owner's application or submission for applicable grants, rebate programs, reimbursement programs (including, but not limited to, energy rebate programs such as "smart start" or "clean energy"), or other similar/related programs. Submit all required documentation, including, but not limited to, detailed pricing information on materials and/or labor, bills of materials, invoices, receipts, counts, take-offs, other related cost information, submittals, shop drawings, etc.. Compile information in format as directed by the owner or owner's representative including tables and other formats as requested.

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### 10. GUARANTEE AND WARRANTIES

- 10.1 The electrical contractor is fully responsible to guarantee all electrical equipment and work (applies to all materials and equipment, including lamps for luminaires) and is fully responsible for all manufacturers' warranties from material purchase (by the contractor), through the date of final acceptance by the owner, to the expiration date(s) of the guarantee and warranties. Guarantee and provide warranties for a period after the date of final acceptance by the owner as per Division 1 General Conditions, unless longer periods are specifically indicated otherwise on the electrical drawings or specifications. Guarantee/warranty periods of less than two (2) years after date of final acceptance are not permitted under any circumstance.
- 10.2 Wherever "warranties" are indicated elsewhere in the specifications, provide and submit (see the section of these specifications "Summary of Submissions") written manufacturers' warranties for equipment. Include all costs in bid associated with providing specified warranties periods (including purchasing any required extended or special warranties to meet the specified periods). Submission of written warranties showing periods, conditions, or coverage of less than the periods, conditions, and coverage specified does not relieve the contractor or manufacturers' of the responsibility to provide warranties with periods, conditions, or coverage as specified. Manufacturers' warranties do not relieve the contractor of any responsibility associated with the electrical contractor's guarantee.
- 10.3 The electrical contractor shall guarantee and respective manufacturers shall warranty equipment and materials from defects in workmanship, materials, and operation. Provide guarantee/warranties including all service, maintenance (excluding routine maintenance), materials, labor, travel, all other work, and all expenses required as part of guarantee/warranties. Provide all guarantee/warranties service at no extra cost to the owner under any circumstance. Provide all guarantee/warranties service in timely manner.
- 10.4 Completely replace or repair, to the satisfaction of the owner, any equipment (as part of this project) improperly installed or damaged before or after installation until expiration of the guarantee period. Completely replace or repair, to the satisfaction of the owner, any equipment (including existing equipment and equipment installed by any other contractor or party) damaged by the electrical contractor (or any subcontractor thereof).

### 11. SEQUENCE OF WORK

- 11.1 Perform work in areas or general sequences (including applicable project phasing) as determined and directed by the owner and architect. Submit (see the section of these specifications "Summary of Submissions") a complete schedule of construction for approval, showing delivery of equipment, erection of equipment, pertinent work related to installation, and when equipment will be placed in operation. Fully coordinate exact sequencing, phasing, and scheduling with all contractors, the architect, and the owner in detail and obtain approval of sequencing, phasing, and scheduling before starting work.
- 11.2 Perform all work in such a manner and associated with sequencing, phasing, and scheduling as applicable and include all costs and manpower allocations in bid. For example, to complete a particular sequence or phase of the work, it may be necessary to perform work in physical areas of the project areas which are covered by and/or part of prior phases or subsequent phases of work (i.e. work in initial phases of the project may involve installing the electrical service and electrical distribution equipment in areas which



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are proposed for renovation as part of a later phase; this would require installing the electrical service and electrical distribution equipment as part of the initial phase). Verify all such conditions, implications, requirements and include costs in bid. No extra consideration, claims, charges, or compensation will be granted under any circumstance for sequencing, phasing, and scheduling.

- 11.3 Maintain service at all times (except as provided elsewhere in the drawings and specifications for shutdowns) and minimize disruptions to all active areas, activities, and operations in and around the scope of work. This specifically includes activities and operations of the owner, third parties in the vicinity of the project, roads and highways surrounding the project, and utility companies serving the project. Coordinate specific requirements with the owner before submitting bids.
- 11.4 Maintain service of life safety systems (specifically emergency lighting and fire alarm) at all times.
- A. As a minimum, maintain the following during construction (except brief periods, not exceeding one (1) working day, while making connections to or transitions between existing, proposed, and temporary systems [where applicable]):
- 1) Maintain code compliant emergency lighting in all occupied areas of the building. Emergency lighting is not required in unoccupied areas and other areas closed to use by building occupants.
  - 2) Maintain manual fire alarm operation throughout the entire building (including areas under construction). This includes manual pull stations (existing, proposed, and/or temporary) at all active building means of egress exits (i.e. exits from each floor to stairwells or the exterior). This includes audible signaling devices to adequately warn building occupants and construction personnel (visual signaling is not required and signaling is not required to comply with the ADA during construction).
  - 3) Maintain supervision of all active sprinklers in the building. This includes monitoring flow, tamper, and pressure switches.
  - 4) Maintain service to automatic fire detection as much as practical. Automatic fire detection is not required to operate in areas of construction at times when construction personnel are present (who can activate manual fire alarms). Other shutdowns of automatic fire detection may be considered, if approved in writing by the owner.
  - 4) Whenever ADA approved signaling is not operational during construction, the electrical contractor's construction personnel shall be instructed with and shall carry out procedures to manually notify any disabled building occupants of fire emergencies (*this provision does not apply if the existing fire alarm system is not ADA compliant or is not present*).
  - 5) Whenever HVAC duct smoke detection systems are not operational during construction, the electrical contractor is responsible for maintaining clear and unobstructed access to HVAC controls and/or disconnecting means (to facilitate manual operation in the event of a fire).

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- B. To satisfy requirements above, any existing and proposed life safety systems may be used as much as practical. Where requirements cannot be satisfied using existing/proposed systems, provide suitable temporary life safety systems (including all associated temporary wiring) as applicable.
- C. Whenever unable to meet the above requirements, the electrical contractor (at the electrical contractor's expense) shall provide continuous fire watch.

### 12. CHANGES TO THE SCOPE OF WORK

- 12.1 Changes to the scope of work include any change effecting the overall nature or cost of the project. Examples of changes to the scope of work include, but are not limited to, additions or deletions of equipment or items of work, substitutions not equivalent or superior to equipment specified, substitutions with characteristics or operation varying from equipment specified, changes which effect the ultimate use or functioning of equipment or areas of the building, changes considered to be "substantial", any change which any party (contractors, sub-contractors, owner, architect, engineers, etc.) believes may involve a possible change in contract price, etc..
- 12.2 Make all changes to the scope of work in complete accordance with the general conditions of the specifications. Submit (see the section of these specifications "Summary of Submissions") changes to the scope of work immediately upon proposal of changes. Do not proceed with any work associated with or affected by changes to the scope of work unless the owner approves changes in writing or authorizes proceeding in writing.
- 12.3 All applicable provisions of the contract drawings and specifications, including addenda and prior changes, apply to all changes to the scope of work, unless specifically indicated otherwise.
- 12.4 In addition to all requirements of the general conditions, submit all pricing related to changes to the scope of work as indicated below. Pricing will not be reviewed until the required breakdowns (summarized below) are submitted.
- 12.5 Submit pricing for a proposed change to the scope of work with detailed breakdown as follows.
  - A. Submit a complete detailed breakdown of all material associated with the proposed change in scope of work. Itemize each unit of material and the respective cost.
  - B. Submit a complete detailed breakdown of all labor associated with each respective item of the above material breakdown. Itemize labor hours and classification for each item of material. Summarize total labor costs, broken down by worker classification and/or billing rate.
- 12.6 Where instructed to proceed with a change to the scope of work on a time-and-material (T&M) basis, submit pricing with detailed breakdown as follows.
  - A. Submit a complete detailed breakdown of all material. Submit copies of all receipts, invoices, and stock material lists.
  - B. Submit a complete detailed breakdown of all actual labor hours. Submit copies of time sheets. Summarize total labor costs, broken down by worker classification and/or billing rate.

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### 13. TEMPORARY POWER AND LIGHTING

- 13.1 For this specification section only, the term "responsible" (in any form) means "responsible to pay all costs (pay to the electrical contractor) to erect the described work". For this specification section only, the term "erect" (in any form) means "furnish, install, maintain, and remove".
- 13.2 The electrical contractor is responsible for temporary power and lighting service/source and distribution during construction. Provide service capacity sufficient for construction. Provide service including any required utility or private metering.
- 13.3 The electrical contractor is responsible for all temporary lighting, all 120 V power for small construction tools, and all other temporary power not exceeding 120 V or 20 A. Power for large tools and equipment exceeding 120 V or 20 A (including arc welders, etc.) is the responsibility of the contractor requesting such power. Temporary power during construction (exceeding 120 V or 20 A) to permanent equipment installed as part of this project (for installing, testing, operating, etc., including mechanical equipment, elevators, etc.) is the responsibility of the contractor requesting such power.
- 13.4 Where a general contractor's construction trailer is present, the electrical contractor is responsible for a minimum 60 A, maximum 200 A single phase service to the trailer. Provide service including any required utility or private metering. Temporary service to any other contractor or subcontractor trailer is the responsibility of the contractor requesting such service.
- 13.5 Where utility power is not available and during shutdowns of utility power, the contractor requesting power under these conditions is responsible for providing portable generator(s), associated temporary wiring, and fuel (sufficient to meet power requirements during these conditions). Generator power to owner loads during construction is not required (unless specifically indicated on the drawings).
- 13.6 The electrical contractor is responsible for temporary power to existing and/or other owner loads, equipment, and wiring as indicated on the drawings.
- 13.7 The electrical contractor shall erect all temporary power equipment and wiring for a complete temporary power installation, regardless of the contractor who is responsible for the temporary power.
- 13.8 Erect all temporary power and lighting during construction in accordance with OSHA and the NEC. This includes required ground fault circuit interrupter (GFCI) protection for personnel and "assured grounding program".

### 14. TESTING

- 14.1 After completing installation of equipment and wiring and prior to energizing or placing in service, test all electrical equipment, conductors, systems, and each and every part thereof to insure continuity, proper splicing, freedom from unwanted grounds, acceptable insulation values, proper operation and functioning, and a complete workmanlike installation to the satisfaction of the engineer and owner.
- 14.2 Completely test all equipment installed. This includes all equipment furnished and installed by the electrical contractor as well as equipment furnished by others and installed

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by the electrical contractor and equipment furnished and installed by others and wired by the electrical contractor.

- A. Electrical tests of panels, switches, and circuit breakers rated 800 A and less and 600 V and less are not required, except that meg-ohm meter testing is required.
  - B. Electrical tests of motors 75 kW (100 hp) and less are not required.
  - C. Electrical tests of individual motor starters are not required. This does not apply to motor control centers (where applicable), where complete testing is required.
  - D. Visual and mechanical checks are required for all equipment (including all panels, switches, circuit breakers, motors, motor starters, and all other equipment) without exception.
- 14.3 Test all equipment and wiring as per the latest edition of InterNational Electrical Testing Association (NETA) standards (Acceptance Testing Specifications (NETA-ATS) for new equipment/wiring and Maintenance Testing Specifications (NETA-MTS) for existing equipment/wiring), unless indicated otherwise. For each piece of equipment, perform testing as shown for that equipment in respective NETA standards. Where equipment is not specifically shown in NETA standards, perform testing as shown for equipment most closely resembling the equipment to be tested. Perform all tests shown in respective NETA standards, unless indicated otherwise. Tests shown as "optional" in NETA standards are not required unless specifically indicated otherwise on the drawings or specifications. Utilize suitable instruments in making all tests, as per NETA standards. Battery, magneto, or similar hand-held testers may be used for preliminary conductor continuity checking but are not acceptable for final results, which must be obtained utilizing proper equipment only (i.e. meg-ohm meter, etc.).
- 14.4 Provide all testing performed by a NETA accredited independent testing firm employed by the electrical contractor, unless indicated otherwise. Provide visual and mechanical checks shown in the NETA standards, testing of transformers 225 kVA and less (with primary and secondary voltages 600 V and less only), and testing of panels, switches, and circuit breakers 1,200 A and less and 600 V and less performed by the electrical contractor's direct employees or by the independent testing firm (at the contractor's option). Provide continuity and insulation resistance meg-ohm meter testing of 600 V and less conductors performed by the electrical contractor's direct employees only.
- 14.5 If requested by the owner or engineer, utilize a recording type (i.e. "Drantz") meter to measure phase-to-phase voltage, phase to neutral voltage, phase currents, harmonic content, and surges in the system. Perform testing for a period of one (1) week. Completely set up and take down meter and submit printout tapes formal test results.
- 14.6 For all testing performed, submit (see the section of these specifications "Summary of Submissions") complete typewritten and tabulated test results for review and approval by the engineer and owner. Submit test result bound together in a single three-ring binder (one (1) binder per set of test results) including a table of contents. Submit quantity of sets as directed in the General Construction specifications, but in no case less than three (3) sets. Submit results upon project completion, except under conditions below.
- 14.7 Where any abnormal, questionable, "failing", or "borderline" test results are encountered or where discrepancies are noted during testing, submit results immediately to the engineer

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before energizing equipment. Do not energize until authorized in writing by the engineer. Test results submitted under these circumstances are not required to be bound or complete.

- 14.8 Where connecting to or otherwise modifying existing wiring, test wiring as follows.
- A. Test existing wiring before performing work to confirm integrity (where testing is performed, the electrical contractor is not responsible for the prior existing condition of wiring).
  - B. Test new wiring before connecting to existing wiring.
  - C. Test connections of new to existing wiring (test new wiring and existing wiring together) and modified existing wiring after performing work.

Where this testing is not performed, the condition of existing wiring will be assumed to be a direct and sole result of work performed and the electrical contractor will be held fully responsible for the condition of existing wiring. Where this testing is not performed and where existing wiring is not in acceptable condition for maintained use or service, the electrical contractor shall repair or replace wiring to the satisfaction of the owner at no cost to the owner.

- 14.9 Provide oscilloscope testing of all variable frequency drives (VFD's) installed as part of this project (with power wiring installed by the electrical contractor), including VFD's furnished by the mechanical contractor, other contractors, or the owner and including VFD's in motor control centers (where applicable). Perform oscilloscope testing to determine the presence/magnitude of voltage surges (at the VFD carrier frequency level, approximately 15 kHz to 25 kHz) associated with reflected wave phenomenon. Perform testing by making oscilloscope measurements at the VFD load terminals and at the motor line terminals (or at the disconnecting means local to the motor where motor terminals are not practical). Record oscilloscope readings with a suitable oscilloscope type "Polaroid" camera (or other recording means which accurately displays equivalent graphic information) and compare readings at the VFD with readings at the motor. Submit photographs with test results. Oscilloscope testing is not required for a VFD located directly adjacent to the motor served, provided the VFD and motor manufacturers submit written certification showing that the complete motor/VFD installation is fully coordinated (including considering reflected wave phenomenon); the electrical contractor is responsible for obtaining this written certification.

## 15. SUBSTITUTIONS

- 15.1 Materials and equipment manufacturers and catalog numbers specified constitute the type and quality of design, material, workmanship, ruggedness of construction, resistance to vandalism, exact operating and performance characteristics, features, configuration, dimensions, etc.. The engineer will consider substitutions of similar equipment superior to specified equipment (meeting or exceeding all characteristics of the specified equipment).
- 15.2 Submit shop drawings associated with substitutions complete with documentation necessary to establish compliance with the specifications (see the sections of these specifications "Shop Drawings" and "Summary of Submissions"). Submit samples of substitutions where requested (see the sections of these specifications "Samples" and "Summary of Submissions"). If documentation and/or samples are not submitted when required, the request for substitution will be denied.

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- 15.3 Determination of compliance with specifications rests with the engineer. When a request for substitution is denied, furnish the equipment specified. The engineer's decisions in cases of substitutions are final and binding upon the contractor, provide equipment accordingly.
- 15.4 Pay all costs associated with a substitution where granted. For the provisions of this section, "substitutions" includes equipment where characteristics or operation vary significantly from equipment specified (including equipment of the specified manufacturer). This includes costs incurred by any party (electrical contractor, other contractors, sub-contractors, owner, architect, engineers, etc.), costs resulting from differences of details, configuration, ratings, operation, characteristics, and dimensions between the specified and substituted equipment, costs to provide features of the specified equipment which may be manufacturer's options of the substituted equipment, and costs to remove and replace work already installed and any other remedial work as a result of substitutions. Approval of substitutions is conditional upon there being no cost change to the contract, unless specifically indicated on the shop drawings submittal and corresponding approval. The electrical contractor is fully responsible for coordinating with the owner, architect, and other trades to identify all possible cost impacts associated with any substitution before releasing equipment and before any party proceeds with work effected by the substitution.
- 15.5 Submit bid based on the items as specified. Substitutions will be considered only after a contract has been awarded.

## 16. SHOP DRAWINGS

- 16.1 Submit a product list indicating all proposed items of products, materials, and equipment as directed in the general construction specifications.
- 16.2 Submit (see the section of these specifications "Summary of Submissions") shop drawings of all equipment and materials proposed to be furnished for review and approval by the engineer. Submit quantity of sets as directed in the general construction specifications, but in no case less than ten (10) sets.
- 16.3 Submit shop drawings for all equipment and materials including, but not limited to luminaires, solid state energy saving ballasts, raceways, conductors, cable, termination methods, grounding, wiring devices, safety switches, enclosed circuit breakers, branch and distribution panels, transformers, contactors, time clocks, photocells, fire alarm system, emergency power and lighting system equipment, engraved plastic nameplates, and any other items requested by the owner, architect, any code official, or engineer.
- 16.4 Stamp or mark shop drawings with the contractor's approval, as evidence that they were checked for accuracy and that all dimensions, characteristics, ratings, operation, features, data, relation to existing conditions, and coordination with work and shop drawings of other trades were completely verified before submission. Approval of shop drawings by the engineer does not relieve the contractor of responsibilities to review shop drawings in detail, to comply with drawings and specifications, for errors contained in shop drawings, for coordination, and to provide equipment as listed.
- 16.5 Where any characteristics, ratings, operations, or features differ from the specified equipment (where not equivalent or superior to the characteristics, ratings, operations, and

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features of the specifications and specified equipment), circle, highlight, or otherwise clearly designate and identify the specific differences.

- 16.6 In the event that shop drawings are not acceptable to the engineer (including as provided below for conditional approval), submit acceptable shop drawings within seven (7) days of notification.
- 16.7 Approval of shop drawings, including approval of substitutions, is conditional that there is no cost change to the contract, unless specifically indicated on the shop drawings submittal and corresponding approval.
- 16.8 Approval of shop drawings is conditional upon the contractor fully and completely complying with all review comments by the owner, architect, and engineer. Where the contractor fails to or is unable to fully and completely comply with every review comment, then the shop drawings are *disapproved* (whether or not they are stamped or noted as "approved" in any manner in any review comment) and must be resubmitted as within seven (7) days (as indicated above). Immediately upon receipt of shop drawing review comments, the contractor is responsible for carefully reviewing all comments in detail and for complying with comments. Where unable to fully satisfy any comment or where the contractor takes exception to any comment, revise and resubmit acceptable shop drawings (or, where taking exception, notify the engineer in writing) within seven (7) days. Where the contractor fails to comply with these requirements (including resubmitting/notifying within the seven (7) day period specified), the contractor shall provide acceptable equipment meeting all specified requirements and all review comments (including removing unacceptable equipment [if installed] and replacing with acceptable equipment) at no cost to the owner.
- 16.9 Do not release equipment until shop drawings are approved. The electrical contractor is responsible for all changes where equipment is released before approval and/or where equipment does not comply with all approval conditions.
- 16.10 In addition to the quantity of shop drawings submitted for approval (see above), submit one (1) copy of *approved* shop drawings to the general contractor, the mechanical contractor, and each other contractor and trade for review and coordination. The electrical contractor is not required to submit copies direct to subcontractors or vendors to other contractors (this is the other contractors' responsibility). The electrical contractor is responsible for all changes and other costs where the electrical contractor fails to submit shop drawings to other parties for coordination.
- 16.11 Obtain copies of all shop drawings relating in any way to electrical work from all other contractors, subcontractors, and trades. Review shop drawings and coordinate with electrical work. Notify the architect and engineer immediately where discrepancies are found. The electrical contractor is responsible for all changes and other costs where the electrical contractor fails to obtain shop drawings or fails to coordinate shop drawing information. Approval of other trades submittals by the architect or engineers (or lack of review by the architect or engineers) does not relieve the electrical contractor of the responsibility to review other trades shop drawings in detail and for coordination.
- 16.12 No extra consideration, claims, charges, or compensation will be granted under any circumstance associated with any party's failure or delay in properly submitting, transmitting, obtaining, reviewing, and/or coordinating shop drawings.

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### 17. SAMPLES

- 17.1 Submit (see the section of these specifications "Summary of Submissions") samples of materials and equipment for approval only where specifically requested by the owner, architect, or engineer. Submit samples along with complete catalog data, installation instructions, operating and maintenance (O&M) information, etc. specifically applying to the samples submitted, to facilitate proper evaluate the quality of the sample. Specifically designate and identify each sample as to the service and location where each sample is to be used on the project.
- 17.2 Submit samples within 30 days of the engineer's request, except where the sample is ancillary to a substitution. Where samples are ancillary to a substitution, submit samples within seven (7) days of the engineer's request.

### 18. AS-BUILT DRAWINGS, MANUALS, AND DEMONSTRATION

- 18.1 Prepare and submit (see the section of these specifications "Summary of Submissions") as-built record drawings showing conditions exactly as installed.
- A. Indicate the exact locations and elevations of all equipment and devices and underground, concealed, and hidden work (including raceways, junction and pull boxes, etc.).
  - B. Indicate exact layout, connections, and conductor routing for all grounding.
  - C. Indicate all substitutions and changes, including updated lighting fixture/luminaire schedule, symbol list, list of alternates, etc..
  - D. For underground work, specifically indicate exact conditions accurately. Where underground wiring does not run straight and direct between visible and obvious equipment, objects, or markers (i.e. markers specifically placed to identify underground work [specifically note the presence and approximate location of all markers on as-built drawings]), clearly, accurately, and exactly *mark* and *dimension* exact underground work (including all bends) from visible permanent landmarks. Acceptable visible permanent landmarks include building walls, retaining walls, curbs, foundations, pole bases, etc.. Lines, joints, and markings on pavements are not considered permanent (since they would be covered by re-paving). Acceptable markers for placement to identify underground work include a 0.9 m (3'0") long piece of 102 mm (4") conduit installed vertically in the ground (top flush with grade) completely filled with concrete (or other similar means providing equivalent or superior visibility, durability, and permanence approved by the engineer). Where the contractor does not include this exact marking/ dimensions on as-built drawings or where marking/dimensions are inaccurate (allowing for a tolerance of not greater than 0.6 m (2'0") away from actual locations), the electrical contractor will be held responsible if underground facilities are damaged in the future (where due to lack of or inaccurate marking/ dimensioning).
- 18.2 During the progress of work, maintain accurate records of all deviations, variations, changes, and corrections from layouts shown on the drawings/specifications on a "record working" set of drawings and specifications kept at the job site for this purpose.



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- 18.3 Upon completion of work, incorporate all information from the "record working" drawings/specifications onto a "marked-up as-built" set of drawings/specifications. Submit the "marked-up as-built" drawings/specifications to the engineer for review, comment, and approval.
- 18.4 Following approval of "marked-up as-built" drawings/specifications, prepare "final as-built" drawings (utilizing the latest version of Autocad (or compatible) software) and specifications (utilizing the latest version of Microsoft Word (or compatible) software). Submit one (1) set of "final as-built" drawing/specifications originals, sets of "final as-built" copies as directed in the general construction specifications (but in no case less than three (3) sets), and "final as-built" drawings/specifications in electronic Autocad (drawings), Word (specifications), and PDF (drawings and specifications) formats. Submit photocopies of all panel circuit directories with "final as-built" drawings.
- 18.5 Submit operating and maintenance (O&M) manuals for all new equipment furnished as part of this contract. Provide O&M manuals including installation, operating, and maintenance instructions for the equipment. Wherever "proof-of-purchase" is required as part of any manufacturer's warranty (whether manufacturer's warranty is specified or not), submit with O&M manuals. Where any proof-of-purchase is required but not submitted (or where insufficient information is submitted), the electrical contractor is fully responsible and liable for providing the warranty. Submit all O&M manuals bound together in a single three-ring binder (one binder per set of manuals) including a table of contents. Submit quantity of sets as directed in the general construction specifications, but in no case less than three (3) sets.
- 18.6 Explain and demonstrate the complete electrical system and all work installed by the electrical contractor to the owner's operating and maintenance personnel. Demonstration is to instruct owner's personnel in the operation and maintenance of systems as well as to prove to the owner correct and adequate operation of all parts of the electrical system. Provide a demonstration period of one (1) full working day for the general electrical installation (including, but not limited to, contactors, time clocks, customer metering equipment, lighting controllers, dimming cabinets, motor controls [where furnished by the electrical contractor], transformer fan controls, generators, transfer switches, key interlocking schemes, and similar equipment, where applicable). Wherever demonstrations are indicated elsewhere in the specifications for equipment furnished by the electrical contractor (i.e. for fire alarm, dimming, sports lighting, stage lighting, UPS units, MCC's, VFD's, metal clad switchgear, power management, sound/paging, security, CCTV, and similar systems, where applicable), provide the specified additional demonstrations during additional periods of time (above and beyond the period above for the general electrical demonstration). Conduct all demonstrations at the project site and after all systems are fully operational.

## 19. SUMMARY OF SUBMISSIONS

- 19.1 Submit items as indicated elsewhere in the specifications (applicable sections are shown for convenience) and as summarized as follows. Information below indicates relative schedule of submission.
- 19.2 Submit upon commencement of construction (as per general construction specifications); resubmit within seven (7) days of notification:

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- A. Permits, licenses, certificates (see 16100-9)
  - B. Schedule of work (see 16100-10)
  - C. Product list (see 16100-17)
  - D. Shop drawings (see 16100-17)
- 19.3 Submit within 30 days of request (within seven (7) days for substitutions):
- A. Samples (see 16100-18)
- 19.4 Submit during the project as applicable (refer to respective specifications sections for conditions and schedule of submission):
- A. Utility service charge estimates (see 16100-9)
  - B. Scope of work changes, w/ breakdowns (see 16100-11)
  - C. Test results, abnormal/failing only (16100-15)
  - D. Short circuit, coordination, and arc flash report (where specified for adjustable circuit breakers)
- 19.5 Submit upon substantial completion of the project:
- A. Approved inspection certificate(s) (see 16100-9)
  - B. Written manufacturers' warranties (see 16100-14)
  - C. Test results (see 16100-15)
  - D. As-built drawings (see 16100-19)
  - E. O&M manuals (see 16100-19)
  - F. Spare parts (where specified elsewhere)
20. SAFETY
- 20.1 Perform all work and work practices in strict accordance with all applicable local, state, and federal codes, standards, regulations, and requirements including OSHA (including the proper use and maintenance of personal protective equipment (PPE) and clothing), state labor and industry, the NEC, ASTM, the National Electrical Safety Code, NFPA, etc..
- 20.2 The term "live" means "energized or capable of being energized at any time for any reason, either intentionally or accidentally".
- 20.3 Suitably protect all live equipment against accidental contact at all times. Install and maintain covers on all live equipment. Where covers are not installed, provide suitable insulating barriers at all live parts. Suitable barriers include arc-resistant NEMA GPO-2 or GPO-3 and UL 94 V-0 electrical grade fiberglass reinforced epoxy compound sheets, rubber insulating blankets, suitable thermoplastic insulating materials, etc. as per OSHA, ASTM, and the NEC. Cardboard and similar materials are not acceptable. Provide listed OSHA approved signs reading "Danger: High Voltage" at locations of live parts and on doors/gates leading to rooms/fences/areas containing the equipment and keep doors/gates locked at all times.
- 20.4 Protect and enclose equipment operating at over 600 V at all times. Equipment is considered adequately protected where all requirements of NEC Articles 110.26 through

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110.34 (including all other articles and codes referenced therein) are satisfied at all times. Where equipment must be exposed for work, or where work is to be performed around normally exposed live parts, provide suitable insulating barriers (suitable for the voltage involved), listed warning signs, and door/gate locking, etc. as shown above. Provide listed OSHA approved warning tape (reading "Danger: High Voltage") around the equipment and all code required working spaces at equipment.

- 20.5 When working on equipment or wiring, properly identify and use lockout devices and tags (in accordance with OSHA requirements) to prevent unauthorized or accidental energizing of equipment and wiring.
- 20.6 Perform all work in or associated with confined spaces (including manholes, hand holes, vaults, crawl spaces, etc.) in accordance with all safety codes referenced above. Obtain appropriate permits where required by the above codes and/or the owner.
- 20.7 Perform all excavation and work in and associated with excavation in accordance with all safety codes referenced above (include all required sloping, benching, shoring, bracing, supporting, shields, protective systems [fall protection, protection of personnel in excavation, protection of structures, etc.], ramps, access/egress, warning systems, rescue equipment, etc.). Provide suitable barricades and safety procedures to restrict pedestrian and vehicular access to areas where work is being performed (including open excavations, lay-down areas, clearance space around operating excavation equipment, etc.). Do not leave excavations open when not actually performing associated work (including at night, during weekends, or when working away from excavations). Leaving excavations open for short periods of time will be considered only when approved in writing by the owner and only where suitably protected. Any request for owner's approval must include a written plan on proposed protection and safety procedures. No extra consideration, claims, charges, or compensation will be granted under any circumstance for any multiple excavations and backfilling needed to satisfy safety requirements.
- 20.8 When working in, on, or near areas subject to vehicular traffic (including public and private roadways, driveways, parking lots, etc. and including loading and unloading equipment/materials in the vicinity of traffic), perform all work and provide appropriate work zone traffic control in accordance with all safety codes referenced above as well as state department of transportation regulations, requirements, and recommendations. Where requested by the owner, architect, or engineer, submit a traffic control plan detailing proposed work zone traffic control and associated safety procedures.

## 21. HAZARDOUS MATERIALS

- 21.1 The electrical contractor is not responsible for and is not required to remove equipment contaminated by hazardous materials, except as indicated below. For this specification section, the term "hazardous material(s)" applies to any materials classified by federal, state, or local authorities having jurisdiction as environmental or health hazards (including, but not limited to, polychlorinated biphenyls (PCB's), asbestos, mercury, radioactive materials, etc.). For this specification section, the term "contaminated" (in any form) means "contains or is contaminated by hazardous material(s)".
- 21.2 The electrical contractor (and all applicable subcontractors) shall be fully insured for performing all work related to, on, and around contaminated equipment and for all work specifically shown in this specifications section as by the electrical contractor. Submit

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proof of insurance to the owner as part of or along with other applicable insurance submittals (as per Division 1 General Conditions, Supplemental Conditions, and Special Contract Requirements).

- 21.3 Immediately notify the owner if any electrical equipment or wiring to be removed or modified as part of this project is contaminated or suspected as contaminated. Identify all areas where disruptive work is proposed (including, but not limited to, excavation, cutting, penetration, drilling, etc.) in advance of performing work so the owner can arrange to have any necessary abatement completed, include all costs and schedule time accordingly. No extra consideration, claims, charges, or compensation will be granted under any circumstance for any delays resulting from abatement of hazardous materials.
- 21.4 When performing work with, on, and around equipment contaminated or suspected as contaminated, assume that the equipment is contaminated until/unless proven otherwise by testing. Exercise care and suitably guard and protect equipment at all times from the start of work until the equipment is either proven by testing as not contaminated or is removed from the project site.
- 21.5 Where existing equipment is specifically shown on the drawings as containing or filled with electrical insulating fluid ("oil", including transformers marked "OA") and where the equipment is specifically indicated on the drawings as being removed, utilize the services of a qualified testing agency (see the section of these specifications "Testing") to sample and test the oil. Test only for content of PCB's in the oil, unless indicated otherwise. Test a sample from each separate tank/compartment containing oil. Verify exact conditions (including the quantity and arrangement of tanks, compartments, and enclosures, the presence of sampling, drain, or fill valves or plugs, removable covers or access panels, etc.) in field prior to submitting bid. Submit written certified test results to the owner.
- 21.6 Where equipment is proven by testing as contaminated or is indicated on the drawings as contaminated, perform work as follows:
- A. Completely de-energize, disconnect, and make the equipment electrically safe.
  - B. The owner, at the owner's discretion, shall perform one (1) of the following two (2) options:
    - 1) Completely remove and dispose of the contaminated equipment.
    - 2) Completely "abate" the contaminated equipment by removing hazardous materials from the equipment in complete accordance with all applicable federal, state, and local laws, ordinances, and regulations.
  - C. Once equipment is abated of hazardous materials by the owner and certified by the abating vendor as no longer contaminated, the electrical contractor shall then remove the equipment as if the equipment was never contaminated.
- 21.7 When removing existing luminaires containing ballasts (fluorescent, H.I.D., etc.), consider all ballasts as being contaminated by PCB's, unless ballast factory nameplate specifically indicates that the ballast does not contain PCB's. The electrical contractor shall completely disconnect, remove, and dispose of all ballasts not contaminated by PCB's. For ballasts considered as contaminated by PCB's, remove ballasts from luminaires, cut all ballast wiring leads within 51 mm (2") of the ballasts, and neatly place ballasts in owner furnished

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drum containers (i.e. 55-gallon). The owner shall dispose of PCB contaminated ballasts in drum containers. For luminaires (with ballasts considered as contaminated by PCB's) where there are signs of ballast rupture or leakage, carefully remove the entire luminaire and turn over to the owner (owner shall dispose of luminaires where PCB leakage is suspected).

END OF SECTION



## SECTION 16200 - ELECTRICAL WORK PRACTICES

### 1. GENERAL PROVISIONS

- 1.1 The applicable requirements and conditions of specifications section "General Provisions" of specifications division 16100, General Electrical, are hereby made an integral part of this section.
- 1.2 The work governed by these specifications includes but is not limited to that as defined in specifications section "Scope of Work" of specifications division 16100, General Electrical.

### 2. INSTALLATION

- 2.1 Provide all equipment and materials in accordance with the recommendations and instructions of the respective manufacturers. This includes recommendations and instructions for equipment furnished by other trades or the owner and installed or connected by the electrical contractor.
- 2.2 Perform all work in an approved first class and workmanlike manner and conform to the best practices of the trade and to all requirements of the NEC.
- 2.3 Protect and preserve all existing, new and proposed raceways, wiring, materials, devices, luminaires, and equipment from corrosion, dirt, paint, building materials, acid, solvents, chemicals, water, ice, tools, overload, freezing, heat, combustion, theft, damage, abrasion, inadvertent removal, improper installation (including where installation has not been completely or properly coordinated), conflicts, interference, vandalism, etc. at all times. Repair or replace all equipment and materials lost or damaged as the result of inadequate protection. Cap and plug open ends of raceways and equipment during construction until wiring is ready to be installed.
- 2.4 Coordinate with and obtain approval of the owner and architect for all exact locations of all outlets, raceways, materials, and equipment. Fully determine and coordinate all exact routing of raceways. Determine routing before submitting bid and bid accordingly, including allowance to avoid any obstructions which may be encountered. The contractor is solely responsible for routing (any routing of raceways which may be shown on any electrical drawing is for reference only to show the recommended basis of design and does not relieve the contractor of the responsibility for fully determining/coordinates all exact routing, nor does it preclude the use of alternative routing). Prior to purchasing conduit or prior to any installation, submit detailed sketches/drawings of proposed raceway routing, equipment locations, and all other details of installation (submit in Autocad format as part of the shop drawings process at the same time switchgear submittal is submitted). Fully coordinate layouts with all contractors and trades before submitting and identify any areas of potential conflict. Any raceways routed in a location not previously approved shall be removed and reinstalled by the Contractor at the Contractor's own expense (no extra consideration, claims, charges, or compensation will be granted under any circumstance associated with routing of raceways).
- 2.5 Completely coordinate installation and routing of all wiring, materials, and equipment in the field and with shop drawing information of all trades prior to rough in of wiring or releasing equipment. Completely inspect equipment and materials upon receiving in the field (including equipment received by other trades where installed or connected to by the electrical contractor) and verify exact installation requirements and details (compare to

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installation and routing as coordinated above) prior to installing, preparing installation, modifying, or handling in any manner which would restrict the ability to return material or equipment in the event of potential installation complications.

- 2.6 Cooperate and fully coordinate all work with the work of all other trades, contractors, subcontractors, and the owner, including work as part of other contracts and projects related to and/or in the vicinity of the specified work. Coordinate the locations of pipes, ducts, structure, reinforcement, foundation components, floor/wall/ceiling construction, raceways, branch and distribution panels, luminaires, devices, electrical outlets, air outlets, motor controls, and all other equipment in order to avoid conflicts, interference, or placing services at the wrong locations. Coordinate all demolition, disconnection, removals, relocations, extension, and re-feeding associated with existing equipment and wiring. Coordinate with shop drawings of all trades. Install all wiring and equipment in such a way to maintain clearance and clear access to all equipment requiring access by code or for operating, servicing, maintaining, replacing, examining, etc.. This includes access to electrical equipment and devices as well as mechanical, architectural, and other equipment including, but not limited to, valves, dampers, sensors, meters, gauges, clean-outs, access doors and panels, operating mechanisms, motors, pumps, fans, air handling and other mechanical equipment, etc.. This specifically includes coordinating wall mounted electrical devices and outlets with wall mounted HVAC equipment (including baseboard, radiation, cabinets, etc.).
- 2.7 Provide all work indicated on the electrical drawings and electrical specifications but involving disciplines of other trades performed by the electrical contractor (or applicable sub-contractors to the electrical contractor), unless specifically indicated otherwise. Perform work in complete accordance with all general construction specifications applicable to the work. This applies to all work including, but not limited to, cutting and patching, excavation, backfill, surface restoration (including paving), concrete, metal fabrication, fire stopping and sealing, painting, etc..
- 2.8 Properly isolate all materials and equipment against the transmission of vibration or noise to, from, or between any parts of the building.
- 2.9 The electrical contractor is fully responsible for determining and verifying all exact details of installation. Where installation details or similar information is shown on the drawings or is otherwise forwarded to the contractor (including during construction), the information represents the minimum criteria required and serves as a guide to the contractor but does not relieve the contractor of the responsibility for determining and verifying installation details.

### 3. GROUNDING

- 3.1 Completely ground and bond all equipment (specifically including all metallic raceways, cable armor, cladding, and shielding, supports, transformers, cabinets, cable trays, service equipment, and the neutral conductor) in strict and complete accordance with all applicable requirements of the NEC.
- 3.2 Provide insulated grounding conductors run with all wiring (not applicable to "BX" armored cable [type "AC"] where permitted elsewhere in this specification).



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- 3.3 Install all metallic raceways in such a way to provide a continuous grounding path without the use of the insulated grounding conductor required above. Include all bonding jumpers and conductors (in addition to the insulated conductor required above) for flexible conduit, loosely jointed raceways, etc.. Provide suitable raceway/conduit fittings for a completely grounded raceway system, including the use of fittings approved and/or listed for grounding, grounding bushings, grounding lock nuts, etc..
- 3.4 Provide all grounding and bonding materials and connections as per specifications section "Grounding Materials" of specifications division 16300, Electrical Materials.
- 3.5 Wherever connections to grounding electrodes or electrode systems are required by code, connect and bond to and interconnect the following.
- A. Provide new driven (made) grounding rod electrodes, for all services and where equipment is located on or below the second floor of a building.
  - B. Connect to the domestic cold water piping system and any other metal piping system where required by the NEC (excluding piping prohibited from bonding/grounding by the NEC).
  - C. Connect to the structural steel and/or metal building frame, where applicable.
  - D. Connect to all existing grounding electrode systems, where applicable.
- 3.6 Wherever the following is installed as part of this project (including where installed by other contractors), connect and bond to the grounding electrode system.
- A. Ground new metal piping systems where required by the NEC.
  - B. Ground new structural steel and/or metal building framing.
  - C. Wherever any new foundation and/or footing is installed with continuous length of 3.0 m (10'0") or more or covering area of 3.3 m<sup>2</sup> (36 sq. ft.) or more, provide concrete-encased electrode(s) as per NEC Article 250.52(A)(3). Provide consisting of not less than 6.0 m (20'0") of #4 AWG bare copper conductor encased in not less than 50 mm (2") of the foundation/footing concrete, except that concrete reinforcement may be substituted for the copper conductor where the size, length, type, and installation of reinforcement complies with NEC Article 250.52(A)(3) for use as a grounding electrode.
  - D. Ground existing or new computer room style raised floors where within the project scope. In addition, connect to grounding for all panels and electrical equipment serving the raised floor area.
- 3.7 Where driven (made) grounding rod electrodes are installed, provide grounding resistance not exceeding 1.0 ohm (maximum). Verify proper ground resistance by testing as per the section "Testing" of this specifications division 16100. Where the measured resistance exceeds the maximum value, install additional ground rod(s) at the location and/or set ground rods in suitable listed and NEC approved chemical ground enhancement material in order to obtain proper values, include all costs in bid.

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- 3.8 Detail all grounding on as-built record documents.
- 3.9 Wherever new wiring or equipment is installed at or near roofs of buildings with lightning protection system(s), bond wiring/equipment to the lightning protection system(s) as per lightning protection codes and standards.

### 4. WIRING METHODS

- 4.1 The wiring methods in this section apply to all systems (including power, lighting, emergency, over 600 V, control, telecommunications, data, fire alarm, sound, security, CCTV, and any other system), unless specifically indicated otherwise.
- 4.2 In finished areas, run all wiring hidden or concealed in/behind ceilings, walls, and floors, include all required cutting and patching. In unfinished areas, wiring may run exposed. Run exposed wiring following building lines.
- 4.3 Utilize steel rigid metal conduit (RMC) for all wiring unless indicated otherwise. Utilize only steel RMC for all exposed visible exterior raceways, for raceways in wet locations above ground, for exposed visible raceways in damp locations, and for all raceways in NEC hazardous (classified) locations (NEC Chapter 5). Utilize only steel RMC (encase in a 76 mm (3") 20 MPa (3,000 p.s.i.) concrete envelope) for raceways in or below grade that are subject to vehicular traffic (except that reinforced concrete encased PVC RNC or concrete encased steel IMC may be utilized as indicated below). Utilize only steel RMC for all wiring over 600 V (except that PVC RNC may be utilized for underground wiring over 600 V as indicated below). Utilize only steel RMC (with concrete encasement where required by code) where field conditions do not facilitate maintaining NEC required minimum cover for underground PVC RNC. For conduits 53 mm (2") and larger, where concrete encasement is not required above, embed all underground 45 degree or greater conduit bends (field fabricated or factory elbows) in a 155 mm (6") 20 MPa (3,000 p.s.i.) concrete envelope.
- 4.4 Steel intermediate metal conduit (IMC) may be utilized for all wiring except conditions indicated above as requiring only steel RMC. Steel IMC may be utilized in any condition where PVC RNC is permitted by these specifications. As an alternate to steel RMC, steel IMC (encase in a 76 mm (3") 20 MPa (3,000 p.s.i.) concrete envelope) is permitted under roadways, parking lots, and other areas subject to vehicular traffic. For conduits 53 mm (2") and larger, where concrete encasement is not required above, embed all underground 45 degree or greater conduit bends (field fabricated or factory elbows) in a 155 mm (6") 20 MPa (3,000 p.s.i.) concrete envelope.
- 4.5 Where permitted by code, schedule 40 or schedule 80 polyvinyl chloride rigid nonmetallic conduit (PVC RNC) may be used underground. Changing PVC RNC thickness (i.e. from schedule 40 to schedule 80 or vice versa) in the middle of any run of PVC RNC is not permitted. Encase all PVC RNC in a 76 mm (3") 20 MPa (3,000 p.s.i.) concrete envelope, unless indicated otherwise. As an alternate to steel RMC, PVC RNC encased in steel reinforced 76 mm (3") 20 MPa (3,000 p.s.i.) concrete envelope is permitted under roadways, parking lots, and other areas subject to vehicular traffic. Provide steel reinforcement consisting of a 12.7 mm (#4) reinforcing rod at each of four (4) "corners" around each conduit in cross section (where encasement includes more than one (1) conduit, rods located between conduits may be "shared"). Provide reinforcing rods

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continuous for the entire length of the reinforced encasement, join rods where required by overlapping not less than 155 mm (6") and wrapping with suitable reinforcing tie wire. In unpaved areas not subject to vehicular traffic, schedule 80 PVC RNC may be installed without concrete encasement. In unpaved areas not subject to vehicular traffic, schedule 40 PVC RNC 27 mm (1") and smaller may be installed without concrete encasement. For conduits 41 mm (1.5") and larger, where concrete encasement is not required by these specifications, embed all underground 45 degree or greater conduit bends (field fabricated or factory elbows) in a 155 mm (6") 20 MPa (3,000 p.s.i.) concrete envelope.

- 4.6 Where runs of PVC RNC protrude exposed and visible above grade or floors, in indoor or outdoor locations, utilize steel RMC for the portions above grade/floor to a minimum depth of 155 mm (6") below finished grade/floor. This requirement does not apply where protruding PVC RNC is completely concealed/hidden within equipment enclosures, walls, or ceilings. Where exposed visible runs of PVC RNC are installed by the contractor (without prior written approval) the contractor shall remove the PVC RNC and install new steel RMC (including cutting and patching to a minimum 155 mm (6") depth and including replacing or reinstalling conductors) at no cost to the owner.
- 4.7 Where permitted by code, electrical metallic tubing (EMT) may be used for interior feeder and branch wiring in locations not subject to abuse or injury. Utilize steel RMC for conditions indicated above as requiring only steel RMC.
- 4.8 Utilize flexible conduit for flexible connections to motors, equipment requiring flexibility, equipment subject to vibration (including transformers), and where required for adjustment, in lengths not to exceed 1.8 m (6'0"). Flexible conduit may be utilized for flexible connections to luminaires only where wiring is concealed or located above accessible ceilings (in lengths not to exceed 1.8 m (6'0")). Exposed visible flexible conduit is not permitted for luminaires, except adjustable luminaires. Flexible conduit may be used where existing walls are fished in lengths not to exceed the portion in the wall plus 0.9 m (3'0"). Utilize liquidtight flexible metal conduit (LFMC, "sealtite"), unless indicated otherwise. Utilize only LFMC in damp, wet, and outdoor locations, mechanical rooms, and for NEC hazardous (classified) locations (except as indicated below). Utilize flexible metal conduit (FMC, "greenfield") in dry locations only (except conditions indicated above as requiring only LFMC). Where flexible connections are required in NEC Class I, Division 1 hazardous (classified) locations, utilize only flexible unions listed as suitable for the application. Flexible conduit/fittings of any type are not permitted as a substitute for conduit bends or offsets under any circumstance.
- 4.9 Where permitted by Code and approved by local authorities having jurisdiction and the owner, armored cable (type "AC", i.e. "BX") and metal clad cable (type "MC") may be used for interior branch wiring concealed in walls/ceilings and hidden above accessible ceilings in dry locations only. Where applicable, comply with NEC Article 518 "Assembly Occupancies". Utilize raceway for all feeder wiring (#4 AWG and larger). Types "AC" and "MC" cables are not permitted in wet, damp, or exterior locations. Types "AC" and "MC" cables are not permitted in exposed visible locations. Type "AC" cable is not permitted for use on circuits exceeding 250 V or for use on DC circuits. Hide cables at panels in electrical rooms and electrical closets as per the section "Branch Panels" of specifications division 16300, Electrical Material. Contact local authorities for approval before submitting bid and include all costs in bid (no extra consideration, claims, charges, or compensation will be granted under any circumstance associated with wiring methods not approved by local authorities).

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- 4.10 Provide surface raceway with integral wiring devices (including receptacles, power outlets, telephone/data outlets, switches, etc.) and/or surface raceway plug-in strips where specifically indicated on the drawings.
- 4.11 Surface raceway without integral wiring devices is permitted only where all of the following conditions are met or where specifically indicated on the drawings. Surface raceway without integral wiring devices is permitted where physically impossible to run wiring hidden or concealed, where impossible to hide or conceal wiring by cutting, patching, and painting, where approved by code, in dry locations only, and where specifically approved by the owner and architect in writing. Permission to use surface raceway without integral wiring devices is conditional upon there being no cost change to the contract, unless specifically indicated on the written approval.
- 4.12 Nonmetallic-sheathed cable (types "NM", "NMC", and "NMS", i.e. "romex") is not permitted under any circumstance. Electrical nonmetallic tubing (ENT), liquidtight flexible nonmetallic conduit (types LFNC-A and LFNC-B), high-density polyethylene (HDPE) conduit, type "A" nonmetallic conduit, and type "EB" nonmetallic conduit are not permitted under any circumstance.
- 4.13 Provide all wiring within air handling plenum spaces in complete accordance with the NEC. Provide wiring methods utilizing metal conduit raceways (as permitted by the specifications) only. Type "MC" cable, where otherwise permitted, may be utilized in plenum ceilings (but not other plenum spaces). Type "AC" cable is not acceptable in plenum ceilings or other plenum spaces.
- 4.14 Provide all wiring in hazardous (classified) locations or similar locations as defined by the NEC (where applicable) in strict accordance with all applicable requirements of NEC Chapter 5. Utilize wiring methods specified above, installed according to the NEC. Provide a complete installation including all required fittings, all required conduit and cable seals, etc. as indicated in the NEC. The applicable scope of hazardous (classified) locations shall be as indicated on the drawings.
- 4.15 Provide conduit and cable seals (utilize a NEC hazardous (classified) locations type, even if location is not classified) for all wiring within or passing through walk-in refrigerators/freezers, cold rooms, other refrigerated spaces, and any other location where wiring is exposed to widely different temperatures, in accordance with NEC Article 300.7(A). Consider these areas as wet locations and utilize aluminum RMC or PVC coated steel RMC for all wiring within or passing through these areas.
- 4.16 Provide all systems wiring (including only fire alarm, telecommunications, data, sound, security, and CCTV, where applicable) in complete accordance with all requirements of other sections of the electrical specifications, except as modified below. Where permitted by Code and approved by local authorities having jurisdiction and the owner, suitable code approved systems type cables (without conduit) may be used for interior systems wiring concealed in walls/ceilings and hidden above accessible ceilings in dry locations only. Contact local authorities for approval before submitting bid and include all costs in bid (no extra consideration, claims, charges, or compensation will be granted under any circumstance associated with wiring methods not approved by local authorities). Systems type cables without conduit are not permitted in wet, damp, or exterior locations. Systems type cables without conduit are not permitted in exposed visible locations. Run wiring in pathways as indicated on the drawings and specifications.

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- A. Provide wiring as directed, recommended, and approved by the respective system manufacturer/utility company and meeting all minimum requirements of the system manufacturer/utility (including where manufacturer/ utility requirements exceed the requirements of the specifications and the NEC).
  - B. Provide all cables as multi-conductor style having an overall jacket (of a color other than red; red is reserved for fire alarm) and utilize only cables approved by the NEC for use with the system.
  - C. Provide all wiring in plenum spaces in complete accordance with the NEC. In dry location plenum ceilings, utilize only plenum rated cables. For damp and wet location plenum ceilings and in all other duct and plenum spaces, run wiring (utilize a non-plenum type suitable for the damp/wet location) in metal conduit. Plenum rated cables may be utilized for other (i.e. non-plenum) applications, but only in dry locations. Plenum cables, even when installed in conduit, are prohibited in damp and wet locations.
  - D. In damp locations, utilize only cables specifically listed and identified for use in damp or wet locations. Provide all cables in wet locations (including underground and embedded in concrete slabs at or below grade, whether in conduit or direct buried) specifically designed for outdoor and submerged use and specifically listed and identified for use in wet locations.
- 4.17 Except as indicated otherwise on the drawings, 21 mm (3/4") raceways are the minimum permitted. No raceway smaller than 21 mm (3/4") is permitted under any circumstance (except where specifically approved in writing by the owner and engineer for the individual condition encountered). Where luminaires, devices, or equipment have factory knockouts or hubs smaller than 21 mm (3/4") size (or smaller than conduit sizes specified on the drawings), provide suitable reducing conduit fittings or provide field knockouts at equipment to match conduit size.
- 4.18 Except as indicated otherwise on the drawings, #12 AWG conductors are the minimum permitted for power and lighting and #14 AWG conductors are the minimum permitted for control and signal systems. #10 AWG conductors are the minimum permitted for outdoor wiring, night lighting circuit wiring, and emergency power and lighting wiring. #10 AWG conductors are the minimum permitted where circuits exceed 23 m (75'0") for 120/208/240 V circuits or exceed 46 m (150'0") for 277/480 V circuits, measured to the center of the load.
- 4.19 Provide a separate neutral conductor with each branch circuit where a neutral is required or indicated on the drawings. Multi-wire branch circuits with a shared common neutral are not permitted, unless specifically indicated otherwise on the drawings. Utilize multi-wire branch circuits with a shared common neutral conductor for lighting controlled by "dual switching" where the lighting is connected to two (2) circuits.
- 4.20 Multiple branch circuits may be installed in the same raceway (including surface raceways) where permitted by code and provided all of the following conditions (A through D below) are met.
- A. Apply appropriate NEC de-rating factors and adjust conductor sizes accordingly. Wiring sizes indicated on the drawings are based on each circuit run in an individual

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raceway (and are not adjusted for de-rating factors), except where multiple branch circuits in a common raceway are specifically indicated on the drawings (wiring is adjusted for applicable de-rating factors in this case, but only for the specific wiring combination shown on the drawings).

- B. Provide no conductor (after de-rating adjustment) exceeding #10 AWG, except grounding conductors as provided below (or as otherwise specifically approved in writing by the engineer).
  - C. Common equipment grounding conductors are permitted in lieu of individual equipment grounding conductors for each individual circuit. Provide minimum single equipment grounding conductor size two (2) standard wire sizes larger than the size as determined in accordance with the NEC. Provide isolated grounding conductors (where required) individually for each circuit and in addition to common equipment grounding conductors.
  - D. Provide raceway fill (after de-rating adjustment) not exceeding 30% (provide maximum number of conductors permitted not exceeding 75% of the maximum number permitted by Code [i.e. refer to NEC Chapter 9 and Annex C] to allow for future wiring). Adjust minimum conduit size to maintain 30% maximum fill.
- 4.21 Minimum raceway sizes indicated in the specifications and on the drawings are applicable to all conduit types specified, except schedule 80 PVC RNC (unless the drawings specifically indicate schedule 80 PVC RNC). Where schedule 80 PVC RNC is utilized and the specified conduit size is 63 mm (2.5") and smaller, increase conduit to the next higher trade size. Where schedule 80 PVC RNC is proposed and the specified conduit size is 78 mm (3") and larger, submit raceway fill calculations; where raceway fill with the specified conduit size exceeds 40%, increase conduit to the next higher trade size.

### 5. WIRING INSTALLATION

- 5.1 Securely support and fasten all raceways, cables, outlets, boxes, equipment, etc. in place as per the NEC. Support at intervals as per the NEC, but in no case exceeding 3.0 m (10'0"). Refer to the section of this specification "Fastenings, Supports, and Hangers" for information.
- 5.2 Where any run of wiring passes vertically through more than one (1) floor level (including where installed in open vertical chases), support at every floor level. For conduits 63 mm (2.5") and larger, utilize only suitable pipe riser clamps (B-Line #B3373 series or approved equal), suitable wall bracket offset pipe clamps (NPHC-National Pipe Hanger Corp. figure #430 series or approved equal), or engineer approved heavy duty steel brackets (fabricated of not less than 6.5 mm (1/4") thick steel and of type, design, and arrangement suitable for the specific application and weights involved) for these floor level supports. Conduit clamps and strut type supports are not acceptable for this application. Equipment as manufactured by B-Line, Erico, and NPHC (or approved equal) shall be considered.
- 5.3 Make all changes in direction of 27 mm (1") and larger conduits with standard elbows or case metal fittings. Fabricate field-made bends and offsets in conduit with suitable hickey/conduit-bending machine. Make conduit bends of the long radius type without kinks, flattening or crushing. Do not install crushed or deformed raceways. Avoid trapped

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raceways in damp and wet locations. Exercise care to prevent the accumulation of plaster, dirt, or trash in raceways, boxes, fittings and equipment during the course of construction. Entirely free clogged or obstructed raceways or replace raceways

- 5.4 Provide raceway ends cut squarely and reamed. Provide raceway installation (including pull boxes as applicable) so there is no more than a total of 360 degrees of bends in any run of raceway. Provide pull boxes at intervals not greater than every 30 m (100'0"), unless otherwise indicated on drawings.
- 5.5 Maintain a separation of not less than 155 mm (6") between all raceways and hot water lines, steam lines, and any other surface with temperature exceeding 104 degrees F (40 degrees C), whenever possible. When not possible to maintain the 155 mm (6") separation, provide insulation pipe covering on the electrical raceways.
- 5.6 Provide a suitable insulating or grounding type (as applicable) bushing on each conduit terminating in a pressed steel box and for each conduit stub. Bushing is not required where conduit terminates in a suitable conduit connector/termination fitting which includes an integral bushing or which provides smoothly rounded surface suitable and approved for use without a bushing.
- 5.7 Wherever raceways pass across structure expansion joints, provide suitable conduit expansion fittings. Where expansion fittings are not listed for grounding, provide external flexible copper grounding strap. Wherever expansion fittings are installed, provide a suitable junction box located not farther than 7.6 m (25'0") from the expansion fitting location. Coil suitable slack conductors in this junction box to allow functioning of expansion fittings. For continuous runs of PVC RNC exceeding 27 m (90'0"), provide expansion fittings at intervals not exceeding 15 m (50'0") to compensate for linear thermal expansion and contraction.
- 5.8 Where metal raceway is installed in contact with or entering earth or concrete in outdoor, wet, or damp locations, coat raceway with engineer approved coal tar or epoxy based corrosion resistant coating (3M, Benjamin Moore, Carboline, or approved equal).
- 5.9 Running threads are not permitted.
- 5.10 Do not run wiring horizontally across floors or the ground, to avoid tripping hazards and facilitate cleaning floors.
- 5.11 Horizontal runs of raceway at rooftops are not permitted (to facilitate future roofing repairs/replacement) except where specifically approved in writing by the architect and owner. Horizontal runs may not exceed 2.4 m (8'0") length. Do not install any wiring or electrical equipment of any type (specifically including disconnecting means and receptacles) within 4.5 m (15'0") of any edge of any roof under any circumstance, to avoid tripping and fall hazards. Equipment and wiring is only permitted within 4.5 m (15'0") of any edge of any roof where necessary to serve utilization equipment within the space and only where specifically approved in writing by the engineer and architect (where approved suitable protective means are included to prevent fall hazards). Support raceways at roofs in a manner to avoid harming, impacting, or compromising the roofing weatherproof integrity (fully coordinate requirement with roofing contractor/supplier [where present], architect, and owner). Where wiring is installed atop roofing material, utilize only pre-cast concrete paving units measuring not less than 12" x 12" x 2" (300 mm x 300 mm x 51 mm)

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laid on the roof and bonded to the roof using suitable roofing adhesive. Running rooftop wiring on wood blocks or bricks is not permitted under any circumstance.

- 5.12 In all kitchens, food preparation, and similar areas, run wiring concealed as much as possible. Where necessary to run wiring exposed, maintain space between raceways and building surfaces and run raceways *vertically only* in such a way to facilitate cleaning walls, ceilings, and floors and to avoid accumulation of foreign materials.
- 5.13 Install wiring in such a manner to avoid infiltrating water into the wiring system (during or after construction). Install wiring in such a manner so any water which does infiltrate cannot become trapped or accumulate and cannot drain into electrical or other equipment.
- 5.14 Install exposed wiring (including visible wiring and wiring in accessible ceiling spaces or other accessible locations) parallel or perpendicular to walls, structural members, or intersections of vertical planes and floors or ceilings.
- 5.15 Install concealed wiring (except as provided above for wiring in accessible spaces) as straight and direct as possible. Detail routing of all concealed wiring on record (as-built) documents.
- 5.16 Space raceways embedded in concrete slabs, walls, beams, etc. or run underground not closer than 76 mm (3") between outsides of raceways and install as to avoid changing the locations of reinforcement.
- 5.17 Except when plans of raceways are approved by the engineer, provide embedded raceways, other than those merely passing through, not larger in outside diameter than one-third the thickness of the slab, wall, beam, etc. in which they are embedded.
- 5.18 Embedded raceways are not permitted to cross, except where the 76 mm (3") spacing and one-third thickness provisions above are maintained or exceeded.
- 5.19 Provide all splices only in suitable code-sized junction or outlet boxes. Splices are not permitted in any type of conduit body under any circumstance.
- 5.20 Do not install any wires in raceways until all raceway work is completed and closed in such a manner as to prevent the possibility of water or other foreign matter entering raceways.
- 5.21 Wherever empty or spare raceways are installed, provide suitable pull wires with identification tags securely attached to each end. Where empty or spare raceways do not terminate in boxes or enclosures, provide suitable conduit caps. Utilize only conduit fitting type caps appropriate for the conduit involved. Rubber and plastic conduit plugs, duct sealing compounds, and tape are not acceptable.

### 6. FASTENERS, SUPPORTS, AND HANGERS

- 6.1 Provide all fastenings, supports, hangers, clamps, and anchors of the type made for the specific purpose for which they are used.
  - A. Utilize wood screws for fastening to wood.
  - B. Utilize toggle bolts or bolt fastenings for fastening to hollow tile, terra cotta, hollow



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- masonry units, lath, and similar construction.
  - C. Utilize machine screws/bolts with nuts for fastening to structural steel.
  - D. Utilize metallic expansion shield anchors and machine screws/bolts for fastening to concrete, brick, and solid masonry. Wooden plugs with screws and plastic expansion shield anchors are not acceptable.
  - E. Threaded studs driven in by a powder charge and provided with washers and nuts may be used in lieu of expansion anchors, machine screws, and wood screws under the applications indicated above.
  - F. Utilize engineer approved adhesive fastening on roofing areas (mechanical fasteners are not be permitted to be driven into roofing surfaces).
  - G. Threaded C-clamps are not permitted.
  - H. Additional acceptable supports for a single 21 mm (3/4") EMT only include common nails for wood, spring-tension clamps for steel and nail-type nylon anchors for masonry.
  - I. Additional acceptable supports for not more than two (2) cables (where cable wiring methods are permitted elsewhere in this specification) only include nails for wood, spring-tension clamps for steel, and nail-type nylon anchors for masonry. A single cable only may be secured directly to wood with NEC approved cable staples.
- 6.2 To prevent swaying, vibrating and/or sagging, rigidly and firmly install raceway and cable (where cable wiring methods are permitted elsewhere in this specification).
- A. Support with malleable or wrought steel clamps, hangers, or with fabricated strut type supports (steel only, aluminum is not acceptable unless specifically indicated on the drawings). Provide strut type supports as B-Line, Kindorf, Power-Strut, or Unistrut (or approved equal).
  - B. Stamped metal one-hole and two-hole straps are permitted to secure EMT and cable wiring methods permitted by the specifications in exposed and concealed dry indoor locations not subject to abuse or injury only.
  - C. Stamped metal wrap around "mineralax" type hangers are permitted to secure EMT and cable wiring methods permitted by the specifications in hidden and concealed dry indoor locations not subject to abuse or injury only. Stamped metal wrap around type hangers are not permitted for visible exposed wiring.
  - D. Additional manufactured fastening systems specifically designed for the purpose shall be considered to secure cable wiring methods permitted by the specifications, but only where submitted for review and approval before commencing work.
  - E. Do not weld raceways, clamps, hangers, or straps to steel structure.
  - F. Wire (including ceiling support wires), perforated pipe straps, plastic ties, "J" hooks, and bridle rings are not acceptable.
- 6.3 Provide all supports and fasteners of the following materials, unless indicated otherwise.
- A. Utilize stainless steel for all applications, unless indicated otherwise. Utilize stainless steel only when underground or in contact with earth or floors in outdoor areas, mechanical rooms, kitchens, and other areas subject to the possible presence of water on the floor/ground.
  - B. Steel protected by hot-dip or mechanical galvanizing after fabrication may be utilized for all conditions except conditions indicated above as requiring only stainless steel. Clean areas where galvanizing is cut or damaged and touch-up with suitable zinc dust/zinc oxide paint.
  - C. Steel protected by pre-galvanizing before fabrication, epoxy coating, zinc electrolytic

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- plating, or other engineer approved corrosion resistant coating may be utilized for interior locations not subject to abuse or injury.
- D. Other materials providing equivalent or superior strength and corrosion resistance to the above shall be considered.
  - E. Supports and fasteners without corrosion protection, protected only by painting, or protected only by oil coating are not acceptable under any circumstances.
  - F. For electrical fasteners (at conductors and all current-carrying parts), utilize only materials and types approved by the NEC and listed for the application.
- 6.4 Provide all fastening, supports, wall brackets, ceiling trapeze, and hangers for the installation of all equipment and wiring. Install all fastenings, supports and hangers in such a way and at such intervals as per NEC or otherwise required to support the equipment. The electrical contractor is responsible for verifying that supports are adequate for the load supported, based upon weight, stresses which may be applied to the support (including when installing equipment, pulling wiring, physical impacts to equipment, and seismic/earthquake loads as per IBC Section 1613), vibration, etc. Submit calculations for any supports where requested by the engineer.
- 6.5 In new concrete structure, engineer approved cast-in-place type inserts (furnished and installed by the electrical contractor and coordinated with and under the direct supervision of the general contractor) may be utilized in concealed locations, unfinished spaces, and other locations where approved by the architect and owner. Inserts may be of the spot or continuous types. Continuous type may be used to directly support raceways.
- 6.6 For all telephone and equipment backboards indicated on the drawings and wherever plywood backboards are installed to support and/or mount electrical equipment, utilize only fire resistant plywood.
- 6.7 Where the contractor installs fasteners or supports not meeting specified requirements (without prior written approval) the contractor shall remove the fasteners and supports and install new fasteners and supports as specified at no cost to the owner.
7. CHASES, RECESSES, AND OPENINGS
- 7.1 Provide, including all excavation, cutting, patching, fire stopping, sealing, backfill, surface restoration, and painting, all required openings, chases, and recesses in the construction for all work.
- 7.2 Where openings are required in new or modified structure, furnish the exact location, size, and other necessary information to the contractor installing or modifying the structure in ample time to have them incorporated during construction as approved by the architect and engineer. If the electrical contractor fails to comply with these information requirements, then the electrical contractor shall perform the necessary cutting and patching at his own expense under the direct supervision of the general contractor.
- 7.3 Where openings in masonry are required, make by coring only.
- 7.4 Locate and provide all openings (including openings for junction and outlet boxes and luminaires) in such a manner to maintain any required fire/smoke rating, waterproof, and sound transmission integrity in accordance with all applicable codes and standards

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(including, but not limited to IBC/BOCA, NFPA, and UL). Where boxes are located in opposite sides of fire/smoke/sound rated walls, maintain minimum spacing between boxes as per NEC. The general contractor shall provide fire/smoke rated enclosures around luminaires and boxes where required to comply with fire/smoke ratings.

### 8. CUTTING, PATCHING, FIRE STOPPING, AND PAINTING

- 8.1 Perform all required excavation, cutting, patching, fire stopping, sealing, backfill, surface restoration, and painting associated with the electrical installation. Perform in accordance with general construction specifications and as indicated elsewhere in this specification. Coordinate all requirements with the general contractor. This includes cutting and patching associated with suspended ceiling tiles and grid.
- 8.2 Completely restore (including painting where applicable) all surfaces to match existing condition as directed and approved by the owner, architect, and engineer.
- 8.3 Completely seal and fire stop all penetrations of all fire and/or smoke rated walls, floors, ceilings and any other construction (including all construction required to be rated by any code) to a rating matching or exceeding the fire rating of the construction. Refer to architectural drawings and specifications for information on fire ratings of building construction and include all costs in bid. Provide the complete installation (including fire stopping methods and materials) complying with all applicable fire rating codes and standards (including the NEC, NFPA, IBC/BOCA, and UL (including the UL "Fire Resistance Directory").
- 8.4 Completely seal and weatherproof all penetrations of exterior, at or below grade, and wet location walls and floors and roof penetrations.
- 8.5 Paint all exposed raceways, boxes, enclosures, etc. as directed by the owner and architect.
- 8.6 Provide baked enamel painted finish for all equipment and materials as directed by the owner and architect. Wherever finish colors are indicated on the drawings (including symbol list and luminaire schedule) as being selected by the architect ("as per architect", etc.), include costs in bid to utilize any of the available standard and/or optional colors listed in manufacturers' catalogs (excluding any colors identified in manufacturers' catalogs as "custom" or "premium").
- 8.7 Touch up damages to prime and/or finished paint coats on equipment. This includes touching-up stainless steel surfaces to avoid superficial surface rust (i.e. at cut surfaces and welds).

### 9. SLEEVES

- 9.1 Provide sleeves in all construction. Provide sleeves of minimum 0.85 mm (22 ga.) galvanized steel, sized for passing raceway/cable, and of the proper design for sealing and flashing around the sleeves where required. Locate and set sleeves extending approximately 51 mm (2") above floor in concealed locations, unfinished rooms, and mechanical spaces. Locate and set all sleeves flush with finished surfaces in finished areas unless otherwise directed by the owner and architect.

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- 9.2 Seal the space between the raceway/cable and sleeve and between the sleeve and structure in an engineer and code approved manner. Seal and fire-stop all penetrations to a fire rating not less than the wall, ceiling, floor, or member penetrated. Completely seal and waterproof all penetrations of exterior walls, roofs, mechanical room floors, or any other area subject to weather or water.

### 10. FLASHING AND ACCESS PANELS

- 10.1 Where a general contractor is present, base flashing is by the general contractor, otherwise base flashing is by the electrical contractor. Counter flashing (provide of 0.47 mm (28 ga.) copper) is by the electrical contractor under all circumstances.
- 10.2 Provide access panels for all items requiring accessibility for operation and maintenance or where required by code. Provide access panels of not less than 1.6 mm (16 ga.) steel frame and not less than 1.9 mm (14 ga.) steel panel, with tamper-proof fasteners, and compatible with the type of construction in which they are installed. Where installed in fire rated walls or ceilings, provide access panels with fire rating matching or exceeding the fire rating of the wall/ceiling involved.
- 10.3 Where a general contractor is present, the electrical contractor shall furnish all access panels and the general contractor shall install access panels under the direction of the electrical contractor.

### 11. LOCATIONS AND MOUNTING HEIGHTS

- 11.1 The approximate locations of luminaires, pipes, switches, radiation, receptacles, outlets and other equipment and materials are indicated on the drawings. Provide actual locations and mounting heights as determined by, confirmed with, and approved by the owner and architect during field construction (prior to rough-in). Where equipment or devices are installed without prior approval/confirmation or without prior written notification (see below) and the location or mounting height is not acceptable to the owner and architect, relocate the equipment and all associated wiring as directed by the owner and architect at no cost to the owner.
- 11.2 Provide mounting heights complying with all applicable federal, state, and local disabled ("handicapped") access codes, standards, and requirements, including the Americans with Disabilities Act (ADA).
- 11.3 Provide mounting heights for all equipment as follows. Utilize standard mounting heights indicated below for all equipment, unless indicated otherwise on the drawings or otherwise directed by the owner and architect. Where installation conditions and/or obstructions make it impossible to install equipment at the standard height, the mounting height may be adjusted to suit conditions, provided the mounting height falls within the listed maximum and minimum heights. Notify the architect and engineer in writing of all conditions where deviating from standard mounting heights. Provide mounting heights not greater than the maximum mounting height and not less than the minimum mounting height under any circumstance, unless specifically approved in writing by the owner, architect, and engineer.

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11.4 All mounting heights listed below are above finished floor, unless indicated otherwise. Mounting heights listed as "to bottom" are measured to the lowest operable part of the equipment or the lowest visual indicating device on the equipment. Mounting heights listed as "to top" are measured to the highest operable part of the equipment or the highest visual indicating device on the equipment.

	<u>Mounting Heights</u>		
	<u>Standard</u>	<u>Minimum</u>	<u>Maximum</u>
<u>Control Devices</u>			
Wall Switches & lighting controls	46" (1.17m) to ctr.	15" (0.38m) to bot.	48" (1.22m) to top
Thermostats & other controls	46" (1.17m) to ctr.	15" (0.38m) to bot.	48" (1.22m) to top
<u>Receptacles and Outlets</u>			
Receptacles, tele/data, & similar *	18" (0.46m) to ctr.	15" (0.38m) to bot.	48" (1.22m) to top
Wall mounted telephones	46" (1.17m) to top	27" (0.69m) to bot.	48" (1.22m) to top
<u>Electrical Equipment</u>			
Safety switches **	See max./min.	15" (0.38m) to bot.	48" (1.22m) to top
Enclosed circuit breakers **	See max./min.	15" (0.38m) to bot.	48" (1.22m) to top
Devices with fuses/breakers **	See max./min.	15" (0.38m) to bot.	48" (1.22m) to top
Contactors **	See max./min.	15" (0.38m) to bot.	48" (1.22m) to top
Transfer Switches **	See max./min.	15" (0.38m) to bot.	48" (1.22m) to top
Time clocks, individual **	See max./min.	15" (0.38m) to bot.	48" (1.22m) to top
Annunciators and displays	46" (1.17m) to ctr.	15" (0.38m) to bot.	48" (1.22m) to top
Equip. indicated with (**) where group mounted	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
Equip. indicated with (**) where too large to mount at above heights	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
Branch panels	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
Wall mounted distribution panels	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
Controllers & grouped controls	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
Individual meter sockets ***	48" (1.22m) to ctr.	36" (0.92m) to ctr.	60" (1.52m) to ctr.
Meter centers ***		Contact engineer	
<u>Fire Alarm Equipment</u>			
Fire alarm controls	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
Pull stations	48" (1.22m) to top	42" (1.07m) to bot.	48" (1.22m) to top
Horns/speakers/strobes/bells ****	80" (2.03m) to bot.	80" (2.03m) to bot.	96" (2.43m) to bot.
<u>All</u> equipment mounted above counters	*****	15" (0.38m) to bot.	44" (1.17m) to top
<u>Other Equipment</u>			
Other equipment mounted on standard electrical outlet boxes	46" (1.17m) to ctr.	15" (0.38m) to bot.	48" (1.22m) to top

Contact the engineer for any equipment not listed or similar to equipment above.

- \* Specifically coordinate with any wall-mounted radiation, if present
- \*\* Applies where equipment is mounted individually, see below for group mounted equipment.
- \*\*\* Provide metering equipment mounting heights conforming to utility company requirements, where applicable, regardless of mounting heights indicated above.
- \*\*\*\* For ceilings lower than 90" (2.29m), mount fire alarm signaling devices 6" (0.15m) below the ceiling. Fire alarm signaling devices may be ceiling mounted if mounted on the lowest portion of the ceiling, if mounted not higher than 9.14 m (30'0") above the lowest floor level in the room and if located and spaced in accordance with NFPA requirements.

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\*\*\*\*\* Standard mounting height for above counter equipment is 6" (0.16m) above back splash or 8" (0.20m) above counter where no back splash is present, but not higher than the maximum shown above.

- 11.5 Where any equipment or device protrudes more than 100 mm (4") from the finished wall surface, mount at height conforming with the ADA and in accordance with the following. Contact the engineer where maximum and minimum heights listed above conflict with mounting requirements summarized below.
- A. Mount so the bottom of equipment/device is 0.68 m (2'3") AFF or less.
  - B. Mount so the bottom of equipment/device is 2.0 m (6'8") AFF or greater.
  - C. Projecting equipment/devices are permitted mounted with the bottom between 0.68 m (2'3") and 2.0 m (6'8") AFF where protected with a suitable warning barrier in accordance with ADA requirements.
  - D. Projecting equipment/devices are permitted mounted with the bottom between 0.68 m (2'3") and 2.0 m (6'8") AFF without warning barrier protection only where specifically approved in writing by the engineer.

## 12. ELECTRIC SERVICE

- 12.1 Perform all electrical service work complying with applicable electric utility company standards and requirements, including metering equipment locations, equipment specifications, service/meter applications, inspections, notification, scheduling, and service pole/manhole.
- 12.2 Utility service-related work shown on the drawings is approximate as a guide to pricing only and is not fully coordinated with respective utility companies. Submit to utility companies for approval all required service/meter application forms and shop drawings on all service-related equipment and materials (service drop, lateral, and entrance conductors and raceways, metering equipment of any kind, any equipment containing a service disconnect or service overcurrent device, any equipment on the line side of a service disconnect, pole risers, transformer pads, transformer connections, any equipment subject to utility company standards/regulations, and any other equipment requested by utilities). Fully coordinate all service-related work in detail with utility companies, and obtain written approval (specifically including formal response to service/meter application) from utility companies, before releasing equipment and before associated rough-in of work. The electrical contractor is solely responsible to fully coordinate and verify service requirements with utility companies (include all costs in bid). No consideration, claims, charges, or compensation will be granted under any circumstance associated with failure to fully coordinate with or obtain full approvals from utility companies.
- 12.3 Reference single line diagram for description of the proposed electrical system.
- 12.4 Where pole risers are indicated on the drawings, provide a complete riser in accordance with all applicable utility company requirements. Verify exact riser requirements with utility company prior to submitting bid (include all costs in bid). Provide riser including all ancillary equipment as directed by the utility company, including (but not limited to)

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raceways stubbed and/or run up pole, molding, grounding, suitable slack conductors, location of riser around circumference of pole, etc..

- 12.5 Provide protective bollards for all pad mounted outdoor equipment. Provide quantity and location as per utility company standards (for both utility and customer owned equipment) unless otherwise indicated on the drawings. Provide consisting of not smaller than 102 mm (4") steel RMC filled with concrete, protruding at least 1.2 m (4'0") above finished grade, set in not less than 0.3 m (1'0") diameter x 0.9 m (3'0") deep concrete base, and in no case less than the minimum construction required by utility company standards. Provide bollards even if not shown on electrical drawings.

### 13. UTILIZATION EQUIPMENT CONNECTIONS

- 13.1 Provide complete power wiring and final connections for utilization equipment as indicated on the drawings. This includes, but is not limited to, all mechanical, kitchen, manufacturing, computer, medical, office, copier, fixed, and portable equipment and apparatus. Coordinate all requirements with the contractor supplying the equipment (the supplying contractor).
- 13.2 Provide connections complete and including power wiring from the electrical contractor provided local disconnecting means to each piece of equipment. If required, pass power wiring through supplying contractor furnished control equipment (including thermostats, relays, timers, integrated controllers, starters, contactors, VFD's, etc.). Provide a single point connection or multiple-point connections (by separating one larger circuit into smaller circuits at controller and/or equipment) as applicable (include all costs in bid). The electrical contractor is responsible for taking deliveries of all control equipment (which power wiring passes through) from the supplying contractor and for mounting and passing power wiring through this control equipment. Locate control equipment as indicated on mechanical or other trades documents or as otherwise coordinated with and approved by the owner, architect, mechanical engineer, and the supplying contractor.
- 13.3 All control wiring and associated raceway is by the supplying contractor (regardless of voltage), unless specifically indicated on the drawings. All central/common control panels are by the supplying contractor (power wiring is by the electrical contractor), unless specifically indicated on the drawings.
- 13.4 Provide safety switches as local disconnecting means at all equipment. Provide switches regardless of whether shown on the drawings or not. Provide switches regardless of whether or not the equipment includes integral unit switches or circuit breakers. Provide outdoor switches as NEMA-3R and indoor switches as NEMA-1.
- 13.5 For all equipment rated 120 V or 277 V and 20 A or less, provide either direct connection, including thermal overload switch where disconnecting means is required, or suitable receptacle where equipment is supplied with cord and plug (combination of plug and receptacle serves as disconnecting means), include all costs in bid.
- 13.6 Prior to rough in of raceway or purchasing any associated electrical equipment, obtain shop drawings from the supplying contractor and verify all requirements. The electrical contractor is fully responsible for contacting and obtaining copies of approved shop drawings from the supplying contractor. This includes fully coordinating the locations of all equipment and wiring in/serving elevator shafts, pits, and machine rooms.

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- 13.7 Where equipment is served by variable frequency drives (VFD's), other solid-state controllers, or other special starters or controllers, wiring indicated on the drawings is as a guide to pricing only. Prior to rough in of raceway or purchasing associated electrical equipment, verify all requirements in writing with the supplying contractor. Provide exact circuit breaker trip amperes (or fuse amperes, where applicable) for circuits feeding this equipment as coordinated with and directed and approved by the manufacturer, include all costs in bid. Where the required circuit breaker/fuse amperes exceed the ampacity of the specified wiring, notify the engineer in writing. Provide all safety switches connected on the load side of VFD's with auxiliary contacts and interconnect (including providing all required wiring in separate 21 mm (3/4") raceway from power wiring) with VFD controls (to prevent and stop operating VFD with load disconnected). Provide all power wiring on the load side of any VFD as a dedicated circuit (from individual VFD to motor served) with no other circuit or wiring (of any kind) in the same raceway.
- 13.8 Where heat trace, control power transformers and control power supplies (rated 500 VA and less), electric alarm bells, plug-in condensate pumps, ultraviolet germicidal lamps in HVAC equipment, electrically operated security devices, door hardware, dampers (including smoke and fire dampers), and valves (including sinks/toilets/urinals), switchgear/switchboard strip/space heaters, etc. are specified on mechanical, plumbing, fire protection, electrical, or architectural drawings or specifications, provide appropriate wiring and power connections (whether shown on electrical drawings or not). Verify and coordinate voltage and wattage/amperes in field and provide wiring accordingly. Obtain power from a suitable nearby branch circuit. Include all disconnecting means switches, junction boxes, receptacles, and other equipment as per code or manufacturer recommendations. Provide ground fault protection (utilizing protective devices complying with the NEC) for all heat tracing.
- 13.9 For ductless split ("mini") style HVAC equipment the electrical contractor shall coordinate in detail with the supplying mechanical contractor before submitting bid to ensure that the equipment is compatible with power wiring shown on the electrical drawings. The supplying contractor shall furnish only equipment which is capable of separate and independent power supply to indoor and outdoor ductless split units (powering indoor unit from outdoor unit is not acceptable, unless specifically indicated on the electrical drawings). The supplying contractor shall furnish only equipment which is arranged so the incoming power wiring is energized all of the time and so the incoming power wiring is not used to control any of the equipment involved. All control wiring between indoor and outdoor units (and branch controllers, where applicable) is by the supplying contractor (see specifications section 13.3 above). Where ductless split equipment is supplied which is normally arranged to control one unit from another by directly switching power wiring, the supplying contractor shall include any necessary suitable relays (and associated wiring and modifications) to accommodate independent power supply. The electrical contractor is responsible for ensuring that this is coordinated in advance and that the ductless split style HVAC equipment, control wiring, and relaying is furnished by the supplying contractor accordingly. No extra consideration, claims, charges, or compensation will be granted under any circumstance associated with coordination of interconnection of ductless split style HVAC equipment.
14. DEMOLITION, REMOVAL, RELOCATION, AND RE-FEEDING
- 14.1 Disconnect, remove, relocate, and/or re-feed existing wiring and electrical equipment as indicated on the drawings (including, but not limited to, as indicated in electrical notes on



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the drawings) and otherwise provided in contract documents. Assume that all demolition and new construction requires disconnecting, removing, relocating, and re-feeding unless verified otherwise in the field. No consideration, claims, charges, or compensation will be granted for any alleged misunderstanding of the scope of disconnecting, removing, relocating, and re-feeding or as a result of failure to verify existing conditions.

- 14.2 Fully verify all requirements associated in any way with demolition, removals, relocations, and re-feeding and include all costs in bid. Visit site prior to submitting bid and investigate and verify all existing conditions (including verifying conditions above all accessible "drop" ceilings and in accessible chases). Completely remove from the site and properly dispose of all equipment and materials removed.
- 14.3 Prior to commencing any removals, completely verify all conditions and exact requirements related to re-feeding, maintaining, or affecting service to existing electrical equipment, devices, and wiring and mechanical, architectural, and other equipment and system in the field during construction. Where equipment or wiring is removed which is required to re-feed equipment, maintain service, or effects systems to remain, replace or reinstall the equipment and wiring. No extra consideration, claims, charges, or compensation will be granted to re-feed, reinstall, replace, reconfigure, etc. wiring and equipment where removed without first verifying all conditions.
- 14.4 Wherever electrical equipment and wiring is removed from visible finished surfaces, patch and restore the surface to the original condition matching existing adjacent surfaces. This includes all required painting, filling all openings (including channels and filling holes left from supports), etc.
- 14.5 Where existing ceilings are removed and reinstalled (either partly or entirely), remove all existing electrical equipment (including lighting fixtures, fire alarm devices [including, but not limited to, smoke and heat detectors, signaling devices, indicators, etc.], security/CCTV cameras, motion detectors, speakers, and all other electrical devices, equipment, and apparatus) from the ceiling grid and ceiling tiles. Leave in place at the ceiling and temporarily support (in a code approved and local authorities having jurisdiction approved manner) to facilitate ceiling removal. Once ceiling is reinstalled, permanently reinstall all electrical equipment in the ceiling. Where new equipment is shown on the drawings, completely disconnect and remove existing equipment (being replaced) and all associated wiring and provide all new equipment and associated wiring as shown on the drawings. Ceilings may be left open for a long period of time (i.e. there may be several months or more between the time of removal and the time of reinstalling ceilings). When ceilings are not in place, maintain (as operational) all fire alarm devices and equipment and normal and emergency lighting (temporarily install fire alarm devices, supported from structure and provide temporary lighting or temporarily support existing lighting from structure as applicable). When ceilings are not in place, safely secure everything which is exposed by the absence of ceilings (new and existing) and keep all areas clean when occupied. This ceiling work is not shown on electrical plans (see architectural drawings and ceiling plans and other trades drawings for information). This ceiling work applies regardless of the party removing the ceiling and regardless of whether or not ceiling removal is shown on drawings. Coordinate with all contractors and trades to confirm the extent of ceiling work and include all costs in bid. This ceiling work also applies where any contractor chooses to install new ceiling in lieu of reinstalling the existing ceiling.

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- 14.6 Where existing ceilings are removed and new ceilings are installed (either partly or entirely), remove all existing electrical equipment (including lighting fixtures, fire alarm devices [including, but not limited to, smoke and heat detectors, signaling devices, indicators, etc.], security/CCTV cameras, motion detectors, speakers, and all other electrical devices, equipment, and apparatus) from the ceiling grid and ceiling tiles. Leave in place at the ceiling and temporarily support (in a code approved and local authorities having jurisdiction approved manner) to facilitate ceiling removal. Once new ceiling is installed, permanently reinstall all electrical equipment in the ceiling. Where new equipment is shown on the drawings, completely disconnect and remove existing equipment (being replaced) and all associated wiring and provide all new equipment and associated wiring as shown on the drawings. Ceilings may be left open for a long period of time (i.e. there may be several months or more between the time of removal and the time of installing new ceilings). When ceilings are not in place, maintain (as operational) all fire alarm devices and equipment and normal and emergency lighting (temporarily install fire alarm devices, supported from structure and provide temporary lighting or temporarily support new or existing lighting from structure as applicable). When ceilings are not in place, safely secure everything which is exposed by the absence of ceilings (new and existing) and keep all areas clean when occupied. This ceiling work is not shown on electrical plans (see architectural drawings and ceiling plans for information).
- 14.7 Where electrical work involves removal and reinstallation of existing ceilings, removal and relocation is the responsibility of the electrical contractor. As an alternative (at the electrical contractor's option) to reinstalling ceilings removed to facilitate electrical work, the electrical contractor may install a new ceiling of a type matching the existing ceiling provided there is no cost change to the contract (wherever new ceiling involves additional cost to the contract, new ceiling is not acceptable).
15. EXCAVATION, BACK-FILLING, AND RESTORATION
- 15.1 Perform all required excavation, cutting, patching, backfill, surface restoration, and painting associated with the electrical installation, perform in accordance with general construction specifications. Coordinate all requirements with the general contractor. Refer to the section of this specification "Cutting, Patching, Fire-Stopping, and Painting" for additional information.
- 15.2 Install all underground wiring to maintain a minimum cover of 0.8 m (2'7") to top of raceways. Where field obstructions do not facilitate the above minimum cover, minimum cover as indicated in NEC Article 300.5 is permitted.
- 15.3 Perform all excavation and work in and associated with excavation in accordance with all applicable safety codes, standards, regulations, and requirements (refer to specifications section "Safety" of specifications division 16100, General Electrical).
- 15.4 Completely restore all surfaces to a condition matching or exceeding the original condition to the satisfaction of the owner, architect, and engineer. Backfilling and restoration below does not supersede or serve as a substitute for concrete encasement of raceways specified elsewhere.
- A. Earth (and other unpaved surfaces) excavation: Backfill with suitable on-site material, preferably utilizing excavated material, and compact during backfill.

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Provide additional material to provide a flush surface after compacting or settlement. Provide seeding (as directed by the owner and architect) to restore grass surfaces.

- B. Sidewalk (and other paved surfaces not subject to vehicular traffic) excavation:  
Where pavement construction joints are spaced not greater than 1.8m (6'0") apart, remove complete blocks of paving to the construction joints to facilitate excavation. Where construction joint spacing exceeds 1.8 m (6'0"), either saw cut pavement at a convenient location or remove to construction joints to facilitate excavation. Backfill with suitable on-site material, preferably utilizing excavated material and compact during backfill. Replace pavement sub-base with new materials to match existing sub-base materials. Replace pavement with new materials to match existing pavement.
- C. Roadway and parking lot (and other surfaces subject to vehicular traffic) excavation:  
Saw cut pavement 76 mm (3") deep prior to excavation. Remove pavement 300 mm (1'0") beyond the edges of below grade excavation ("cut-back" pavement 300 mm (1'0") on both sides of trench). Backfill with suitable on-site material, preferably utilizing excavated material and compact during backfill. Replace pavement sub-base with new materials to match existing sub-base materials. Replace pavement with new materials to match existing pavement, filling the entire width of the excavation with "cut-backs".
- D. Optional roadway and parking lot (and other surfaces subject to vehicular traffic) excavation: The following may be substituted for the methods indicated in item "C" above at the contractor's option. Saw cut pavement 76 mm (3") deep prior to excavation. Remove pavement to the same width as the edges of below grade excavation (without any "cut-back"). Back fill with concrete only to the bottom of the sub-base. Replace pavement sub-base with new materials to match existing sub-base materials. Replace pavement with new materials to match existing pavement.

- 15.5 Completely remove and properly dispose of any material excavated and not utilized for backfill, include all costs in bid.

### 16. HOUSEKEEPING AND EQUIPMENT PADS

- 16.1 Mount all fully or partially freestanding electrical equipment on pads as follows. Where equipment is installed without pad (without prior written approval) the contractor shall remove the equipment, provide a suitable approved pad, and reinstall the equipment (including providing temporary power [including the use and cost of a generator if required] to maintain service) at no cost to the owner.
- 16.2 Provide all floor/roof mounted equipment on 100 mm (4") concrete housekeeping pad.
- 16.3 Provide all outdoor ground mounted equipment on a suitable pad. Level grade around pad. Provide top of pad 155 mm (6") nominal above finished grade (100 mm (4") minimum at any point).
- 16.4 Provide all housekeeping and equipment pads in complete accordance with equipment manufacturer's requirements and recommendations. This includes, but is not limited to anchor bolts, reinforcement, minimum thickness, pad openings/cutouts, raceway stubs,

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overall dimensions/shape, steel leveling channels, concrete characteristics, grounding (including grounding grids and loops), and structural details. Where applicable, provide pads as per utility company standards. For any equipment exceeding 500 kg (1,100 lb), submit shop drawings of exact pad construction, fabrication, and characteristics. This includes sealing (by a registered professional engineer) these shop drawings where requested by local authorities having jurisdiction for review.

- 16.5 Where approved by the manufacturer, engineer, and utility company (where applicable), pre-cast concrete pads and foundations may be utilized for outdoor installation. Install and set all pre-cast concrete pads on a smooth, compacted, and level base of not less than 155 mm (6") of crushed stone (or sand, for manhole style vault foundations 1.2 m (4'0") or deeper) according to manufacturer's (and utility company, where applicable) recommendations.
- 16.6 Where the project schedule, shutdown considerations, or other project conditions do not allow the time required for a cast-in-place indoor housekeeping pad, utilize a suitable custom pre-cast housekeeping pad (include all costs in bid). Pre-cast housekeeping pads may also be used under other conditions where approved in writing by the engineer and owner. Submit shop drawings for review and approval. Provide complete with openings pre-cast or cored in advance to facilitate conduit stub-ups (where applicable). Secure pad to the floor utilizing suitable concrete anchors. Set pad on wet bed of grout/mortar (to provide a firm and level surface regardless of floor surface conditions/irregularities) and utilize shims (to level pad and avoid pad settling before/while grout/mortar cures). Where a new cast-in-place pad will be poured adjacent to a new pre-cast pad, provide 10 mm (3/8") (minimum) reinforcement cast into and stubbed out from the pre-cast pad (extending at least 230 mm (9") and spaced not farther than 230 mm (9") on center) in the direction of proposed poured pad.

END OF SECTION

## SECTION 16300 - ELECTRICAL MATERIALS

### 1. GENERAL PROVISIONS

- 1.1 The applicable requirements and conditions of specifications section "General Provisions" of specifications division 16100, General Electrical, are hereby made an integral part of this section.
- 1.2 The work governed by these specifications includes but is not limited to that as defined in specifications section "Scope of Work" of specifications division 16100, General Electrical.
- 1.3 Provide all materials and equipment (products) as new, the best in grade and quality, and manufactured in the United States of America with standards and ratings as specified herein. No substitution or deviation from the materials and equipment specified is permitted except by written permission from the engineer. Provide all materials and equipment as listed and/or labeled where applicable.
- 1.4 Replace or repair, to the satisfaction of the owner, any materials and equipment damaged before or after installation.
- 1.5 Materials and equipment manufacturers and catalog numbers specified constitute the type and quality of design, material, workmanship, ruggedness of construction, resistance to vandalism, exact operating and performance characteristics, features, configuration, dimensions, etc.. Where multiple manufacturers are shown in the drawings and/or specifications, not all manufacturers shown may be capable of providing materials and equipment meeting the specifications, field conditions, etc.. Manufacturers not specifically shown on the drawings or specifications shall be considered, provided the products are equivalent or superior to the requirements of the drawings and specifications (including equivalent or superior to products and/or manufacturers specifically shown on drawings and specifications). Manufacturers, whether shown on the drawings or specifications or not, are acceptable only if they can meet the specifications, conditions, and requirements specific to this project. The terms "equivalent", "equal", "equaling", and "approved equal" mean "equivalent or superior to the item/process specified when approved by the engineer", unless otherwise noted.

### 2. RACEWAYS

- 2.1 Steel Rigid Metal Conduit (RMC) and Steel Intermediate Metal Conduit (IMC)
  - A. Provide steel RMC as full weight, heavy wall, mild steel pipe, galvanized inside and outside.
  - B. Provide steel IMC as standard wall steel pipe; otherwise the same as steel RMC.
  - C. Provide fittings for steel RMC and steel IMC of high grade steel, having rust resistant finish, providing ample wiring space, having smooth round edges, and having full threaded hubs.
  - D. Utilize only fully threaded screw-on fittings with steel RMC and steel IMC (coat field-cut threads as per NEC Article 300.6(A)). Compression, set screw, bolt on, or other thread-less fittings are not permitted.

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### 2.2 Electrical Metallic Tubing (EMT)

- A. Provide EMT of high grade steel and galvanized inside and outside. Enamel coating only is not acceptable.
- B. Provide fittings for EMT of high-grade steel, having rust resistant finish, providing ample wiring space, and having smooth round edges. For EMT in damp locations (i.e. concealed), utilize only fittings of the thread-less compression type without set screws. For EMT in dry locations only, thread-less set screw steel type fittings are permitted. Die cast, set screw, and indenter fittings are not permitted.

### 2.3 Flexible Metal Conduit (FMC) and Liquidtight Flexible Metal Conduit (LFMC)

- A. Provide FMC ("greenfield") of high-grade steel, galvanized inside and outside, having a smooth interior, and providing a continuously effective ground. Provide fittings for FMC of high grade steel, having rust resistant finish, providing ample wiring space, having smooth round edges, of the two (2) screw type, listed and NEC approved for grounding.
- B. Provide LFMC ("sealtite") with an overall PVC sheath; otherwise the same as FMC. Provide fittings for LFMC of high grade steel, having rust resistant finish, providing ample wiring space, having smooth round edges, listed and NEC approved for grounding, and of the sealing compression gland type.
- C. Where applicable, provide FMC and LFMC manufactured to comply with NEC Article "Places of Public Assembly".

### 2.4 Polyvinyl Chloride Rigid Nonmetallic Conduit (PVC RNC)

- A. Provide PVC RNC of virgin PVC (or material reground from the manufacturer's own products), heavy wall, schedule 40 or schedule 80.
- B. Provide fittings for PVC RNC of schedule 40 virgin PVC, providing ample wiring space, and having smooth round edges. Make all interfaces between PVC RNC and raceways, enclosures, boxes, other conduit types, etc., utilizing adapter fittings designed for the purpose.
- C. Make all joints utilizing solvent welding method, installed to be completely watertight and pressure-tight to 172 kPa (25 p.s.i.).
- D. High density polyethylene (HDPE) conduit and type "EB" encased burial and type "A" PVC conduits are not permitted under any circumstance.

### 2.5 Surface Raceway

- A. Surface raceway with integral wiring devices: Provide steel or aluminum type as indicated on the drawings. Utilize one (1), two (2), or three (3) compartment types (with dividers as applicable) as indicated on the drawings.
- B. Surface raceway without integral wiring devices: Provide steel type. Utilize Wiremold types #V700, #V2000, #V2100, or #V2400 (or approved equal) sized

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according to the number of conductors to be run in the raceway. Utilize the smallest size raceway facilitating conductors. Raceway smaller than #V700 type is not acceptable.

- C. Surface raceway plug-in strips: Provide steel type, Wiremold #V2000 series (or approved equal). Provide with #12 AWG through wiring suitable for use on 20 A branch circuits. Provide with 15 A, 120 V single receptacles 300 mm (12") on center, unless indicated otherwise. Provide one (1) or two (2) circuit type as indicated on the drawings.
- D. Provide all steel surface raceways in factory ivory finish. Provide final painting (over the ivory factory finish) as directed by the owner and architect in the field. Provide all aluminum surface raceways in natural brushed aluminum finish.
- E. Nonmetallic surface raceways are not permitted, unless specifically indicated otherwise on the drawings.
- F. Provide all installations of surface raceways complete including all required fittings, accessories, details of installation, etc.. Include costs in bid for installing surface raceways around all obstructions encountered.
- G. Provide fittings for surface raceways manufactured by the surface raceway manufacturer and specifically designed to be used with and compatible with the surface raceway and the actual installation conditions encountered. Provide fittings for surface raceways having rust resistant finish, providing ample wiring space, and having smooth round edges. Provide device box type fittings as per the section of this specification "Outlet, Switch, and Junction Boxes".
- H. Perform all cutting, bending, and offsetting of surface raceways and components utilizing tools specifically designed and manufactured for the purpose by the surface raceway manufacturer. Cutting with hacksaws and bending/offsetting with standard conduit benders is not acceptable. Where the manufacturer does not manufacture or supply tools to perform work required (as indicated in manufacturer's standard catalogs), use only tools specifically recommended and approved for the purpose by the manufacturer.
- I. Fasten and secure all surface raceways utilizing hardware concealed by the surface raceway. Visible securing and fastening hardware is not acceptable except that Wiremold #V5703 (or approved equal) supporting "back clip" type fasteners are permitted with #V700 style surface raceway without integral wiring devices only. One (1) or two (2) hole straps over the raceway are not acceptable.
- J. Specifications are based on equipment as manufactured by Wiremold. Equipment as manufactured by Hubbell and Mono-Systems (or approved equal) shall be considered.

### 3. OUTLET, SWITCH, PULL, AND JUNCTION BOXES

- 3.1 Provide boxes of proper types and sizes to facilitate installation and as per code at all outlets and junctions indicated on the drawings and as otherwise required.

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- 3.2 In unfinished areas, mount boxes flush or exposed. In finished areas, mount boxes flush in ceilings, walls, and floors, include all required cutting and patching. Where impossible to mount flush in finished areas or where surface wiring is required to serve equipment in finished areas, finished style (Wiremold #V5730 to #V5760, equipment as manufactured by Hubbell or Thomas & Betts (or approved equal) shall be considered) surface boxes are permitted. Standard style pressed steel boxes are not permitted in finished areas. Where the contractor installs improper boxes in finished locations (without prior written approval), the contractor shall remove the boxes and install new boxes flush mounted (including cutting and patching to flush mount boxes and wiring and including replacing or reinstalling wiring) at no cost to the owner.
  - 3.3 Utilize boxes of either unit or ganged construction and sized for devices and wiring installed and not smaller than the minimum sizes as per the drawings and specifications (and in no case smaller than the minimum size permitted by the NEC). Provide boxes as galvanized pressed steel (unless indicated otherwise), not less than 4" square, and with the proper size knockouts to facilitate wiring.
  - 3.4 For flush mounted boxes, provide box shape permitting surfacing materials to be on straight lines and to fit closely around the box. Provide boxes in plastered, drywall (GWB), and similar walls, partitions, and ceilings with suitable plastering rings.
  - 3.5 Utilize cast and/or malleable rust-resisting steel boxes for wiring in exterior, wet, or damp locations and for exposed visible steel RMC and IMC runs. Utilize aluminum or alloy boxes only where aluminum conduit is permitted by the specifications and used.
  - 3.6 For all boxes in floors, utilize only boxes specifically designed, NEC approved, and listed for floor installation (including maintaining fire rating of the floor).
  - 3.7 Provide all boxes for lighting outlets with studs of a size suitable for the weight of the luminaire supported (in no case less than 10 mm (3/8")). Provide the stud of integral construction with the box or of the type inserted from the back of the box. Studs held to the box with bolts to support luminaire weight are not permitted.
  - 3.8 100 mm (4") diameter "octagon" boxes are not acceptable, except under the following conditions. Octagon boxes are permitted in conjunction with luminaire mounting studs where studs are required above. Octagon boxes are permitted where required to mount equipment where equipment is not compatible with square or ganged type boxes (including the use of adapter rings on square boxes).
  - 3.9 Secure boxes firmly in place and set true, square, and flat or flush (as applicable) with finished surfaces. Keep all unused knockouts closed or close with suitable threaded plugs (for threaded knockouts or hubs) or knockout seals (for unthreaded knockouts). Install flush mounted boxes so the covers are flush with the finished surface.
  - 3.10 Provide all boxes with cover plates as specified below.
4. COVER PLATES
- 4.1 Provide cover plates for switches, receptacles, outlet and junction boxes, and other devices of 1.0 mm (0.04") thick metal with paint finish or of stainless steel (as directed by the



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- owner and architect, include costs in bid for painted or non-magnetic stainless steel), unless indicated otherwise.
- 4.2 Utilize suitable pressed galvanized steel code gauge raised covers for exposed wiring methods in unfinished areas and accessible hidden locations. Flat pressed galvanized steel code gauge covers may be utilized on junction boxes (where devices are not installed) or for ganged devices (three (3) gang or greater only). Tile and/or plastering rings style covers are not permitted for exposed wiring methods under any circumstance.
  - 4.3 Utilize cast rust-resisting steel or #302 stainless steel covers with gaskets for boxes in wet, damp, or exterior locations or other locations where cast steel boxes are utilized.
  - 4.4 Provide suitable blank covers on all unused boxes and boxes for future use (including boxes where devices are not installed at the time that electrical work is completed; specifically including telephone/data outlets where jacks and covers are not installed).
5. CONDUCTORS AND CABLE (600 V)
- 5.1 Provide all wiring (for all systems) utilizing multiple single conductors in raceway, unless indicated otherwise. Conductor sizes indicated in the specifications and on the drawings are the minimum that will be accepted (conductor sizes are identified based on the NEC, as either American Wire Gauge [AWG] or thousands of circular mils [MCM or kcmil]). Where the contractor installs conductors smaller than the minimum size, the contractor shall remove conductors and install new conductors of the specified size at no cost to the owner.
  - 5.2 Provide all conductors (including conductors in cables, where permitted) as 600 V, having flame retardant, heat resistant, and moisture resistant insulation, and listed and marked in accordance with industry standards and the NEC. Unless indicated otherwise, provide all conductors identified both as type "THHN" and as type "THWN" ("THHN/THWN"), rated 90 degrees C for dry and damp locations and rated 75 degrees C for wet locations. Conductors identified as type "XHHW" (in lieu of type "THHN/THWN") are permitted only where conductors are of the compact stranded type (type "XHHW" is not permitted for solid conductors or for standard concentric or compressed stranded conductors). Provide all conductors for all systems of a type suitable for installing in dry, damp and wet locations. Conductors suitable for dry locations only and conductors suitable for dry and damp locations only are not acceptable (except as specifically otherwise provided for plenum rated systems cables).
  - 5.3 Provide all conductors of soft drawn copper (Cu, CU) wire of 98% conductivity. Aluminum (Al, AL) conductors are not acceptable, unless specifically indicated otherwise on the drawings.
  - 5.4 For wiring installed in high temperature locations subject to temperature exceeding 60 degrees C (140 degrees F), utilize conductors with special heat resistant insulation based on and listed for exact temperature conditions and location classifications encountered (consult engineer for exact conductor type; include costs in bid to utilize any of types "FEPB" (glass braid type only), "MI", "PFA", "SA", "THWN-2", "Z", and "ZW"). Install wiring in high temperature locations in conduit raceways (surface raceways and cable wiring methods without conduit are not permitted, except type "MI" cable); provide respective conduit sizes in accordance with NEC raceway fill requirements. Transition to standard conductor types

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are permitted (in a suitable junction box) beyond the minimum distance as per NEC Article 310.15(A)(2), Exception, measured from the first point where normal ambient temperature occurs.

- 5.5 Where permitted elsewhere in this specification, provide metal clad cable (type "MC") having interlocked steel or aluminum cladding and having conductors as specified above, including an insulated grounding conductor. Provide conductors #10 AWG and smaller as solid and conductors #6 A.W.G and larger as stranded. Conductors #8 AWG may be solid or stranded. Provide type "MC" cable listed and NEC approved to provide an acceptable grounding path. Provide fittings for type "MC" cable of suitable pressure pad/clamp type, high grade steel, having rust resistant finish, providing ample wiring space, having smooth round edges, and having full threaded hubs. Fittings utilizing set screws are not acceptable. "Snap-in" fittings of any kind (including, but not limited to, fittings designed to fasten in knockouts or hold cable with spring tension, fittings without treaded hubs, and fittings designed to be installed without the use of tools) are not acceptable. Provide type "MC" cable as listed and install in complete accordance with NEC Article 330. Where permitted by the NEC (including Article 604), listed manufactured wiring systems consisting of cables identified as type "MC" may be utilized wherever specifications allow the use of type "MC" cables. Where permitted by the NEC (including Articles 725 and 770), listed type "MC" cables containing Class 2 and Class 3 cable and/or optical fiber members in addition to power conductors may be utilized wherever specifications allow the use of type "MC" cables.
- 5.6 Where permitted elsewhere in this specification, provide armored cable (type "AC") having interlocked steel or aluminum armor and having conductors as specified above along with a code sized copper or aluminum (compatible with armor material) armor bonding wire. Provide conductors #10 AWG and smaller as solid and conductors #6 A.W.G and larger as stranded. Conductors #8 AWG may be solid or stranded. Provide type "AC" cable listed and NEC approved to provide an acceptable grounding path. Provide fittings for type "AC" cable of suitable pressure pad/clamp type, high grade steel, having rust resistant finish, providing ample wiring space, having smooth round edges, and having full threaded hubs. Fittings utilizing set screws are not acceptable. "Snap-in" fittings of any kind (including, but not limited to, fittings designed to fasten in knockouts or hold cable with spring tension, fittings without treaded hubs, and fittings designed to be installed without the use of tools) are not acceptable. Provide type "AC" cable as listed and install in complete accordance with NEC Article 320. Where permitted by the NEC (including Article 604), listed manufactured wiring systems consisting of cables identified as type "AC" may be utilized wherever specifications allow the use of type "AC" cables.
- 5.7 Where direct buried cables/conductors are specifically indicated on the drawings, provide conductors as 600 V, having flame retardant, heat resistant, moisture resistant, and sunlight resistant insulation and identified and listed as types "RHH/RHW-2/USE-2". Where messenger supported aerial multiplex cables are specifically indicated on the drawings, provide conductors as 600 V (with flame retardant, heat resistant, moisture resistant, and sunlight resistant insulation of a type in accordance with the NEC) with bare messenger to support the cable (hard drawn for copper conductors or ASCR for aluminum conductors).

## 6. SPLICES, TAPS, AND CONNECTIONS

- 6.1 Make all splices, taps, and connections at locations indoor and above ground only. Splices, taps, and connections are not permitted below grade (including below any floor level where

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the floor is in direct contact with earth, i.e. basement slabs, slabs on grade, etc.), or where subject to being submerged (except as specifically provided as follows). Route raceways and wiring accordingly and include all costs in bid. Where physically impossible to install wiring to make splices/taps above grade, splices/taps below grade shall be considered where specifically requested in writing in advance (prior to installing conductors) by the contractor and where approved in writing by the engineer. Specifically and individually identify each and every case involved for below grade splices/taps in the request(s) and submit shop drawings for splices/taps (as indicated below). Where below grade splices/taps are installed by the contractor (without prior written approval) the contractor shall remove the raceways, wiring, splices, and taps and install new raceways and wiring in such a manner to completely avoid below grade splices/taps at no cost to the owner.

- 6.2 Perform all splices/taps in suitable code sized outlet and junction boxes only, not in raceways, conduit bodies, or equipment cabinets. Clean each strand of conductors carefully before connecting.
- 6.3 Where aluminum wiring is permitted elsewhere in this specification or where connecting to existing aluminum wiring, utilize only suitable crimp-on compression connectors/lugs. Bolted pressure type connectors/lugs are not acceptable under any circumstance. Where aluminum wiring terminates in factory installed bolted pressure lugs at equipment, utilize suitable crimp-on compression adapters (IlSCO #CPM, #ACM, and #ACO types or approved equal).
- 6.4 Insulation piercing type splices, taps, and connections of any kind are not permitted under any circumstance (including where applied after removing insulation).
- 6.5 Provide connections at equipment, apparatus, and devices for a complete installation and as follows. Coordinate all requirements with equipment to connect.
  - A. Where equipment includes factory "pig tails" for connections, make connections as specified above for splices and taps.
  - B. For stranded wiring #10 AWG and smaller, utilize suitable crimp-on "stacon" type terminals. Where equipment terminals include pressure pads, wiring may terminate directly at equipment without crimp-on terminals. Connecting stranded wiring directly at wire binding screw terminals (i.e. wrapped around screw) is not permitted under any circumstance.
  - C. For solid wiring #8 AWG and smaller, provide wiring connecting directly at terminals.
  - D. For wiring #6 AWG and larger and #8 AWG stranded wiring, utilize suitable crimp-on compression lugs. Where equipment is provided with factory-installed lugs, wiring may connect directly at factory lugs.
- 6.6 Where equipment (including equipment furnished by other contractors or the owner) is provided with factory installed lugs and the factory-installed lugs do not facilitate the specified wiring sizes, provide complete connections as summarized for the following options. Options "A" and "B" apply where the specified conductors are either larger than the maximum conductor for the lug or smaller than the minimum conductor for the lug. Option "C" applies where the specified conductors are larger than the maximum conductor for the lug.

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- A. Remove factory lugs and provide new suitable field-installed lugs. This option is not permitted where removal and replacement of lugs would violate equipment listing or where factory lugs are not removable.
  - B. Utilize suitable crimp-on compression reducing adapters to splice between specified conductors and conductors compatible with factory lugs. Perform this splice within the equipment enclosure containing the factory lugs (where there is sufficient NEC required space for splices) or in a code sized junction box outside of the equipment enclosure (where sufficient space is not available). Install splices as indicated above for splices and taps. Provide conductors between the reducing adapters and the factory lugs insulated, as short as practical, and sized as per the NEC and the factory lugs. Utilize Burndy types #YSV, #YRV-L, #Y-R (Cu), and #YRB (Cu/Al) reducing adapters (or approved equal). Coordinate exact types and sizes with actual conductors involved.
  - C. Utilize suitable crimp-on compression pin type adapters on the end of conductors connecting in the factory-installed lugs. Utilize Burndy types #YE-P, #YE-P-FX (Cu), #AYP, and #AYPO (Al) pin adapters (or approved equal). Coordinate exact types and sizes with actual conductors and factory lug size involved.
- 6.7 Provide splices and taps at indoor locations and outdoor locations above ground (excluding exposed outdoor splices/taps) as follows.
- A. For stranded wiring #10 AWG and smaller and solid wiring #8 AWG and smaller, make splices/taps by twisting conductors together and utilizing suitable pressure type "wire nut" connectors. Tightly over-wrap with vinyl insulating tape. Utilize listed wire nuts with internal coiled square metal binding spring ("all plastic" and porcelain wire nuts are not acceptable under any circumstance). For splices/taps in wet locations, utilize only "self-sealing" wire nuts with integral water repellent non-hardening sealant (Ideal #60 "DB Plus" or approved equal).
  - B. For wiring #6 AWG and larger and for #8 AWG stranded wiring, make splices/taps utilizing suitable crimp-on compression connectors. Bolted type connectors are not permitted, except where available crimp-on compression connector configurations do not correspond to combinations and arrangement of conductors to be connected. Wrap with rubber insulating tape or vinyl mastic of type, thickness, and insulation level equaling or exceeding the original insulation then tightly over wrap the entire assembly with vinyl insulating tape covering all rubber tape/mastic without gaps or voids.
- 6.8 Provide all splices and taps underground, below grade, and subject to being submerged (where specifically approved in writing by the engineer) as follows. Provide splices/taps of direct buried and open aerial wiring (where specified elsewhere) as follows. Submit shop drawings for all proposed splice/tap products and methods. Where any splice/tap is installed in any underground, below grade, submerged, or exposed wet or outdoor location for which shop drawings are not previously submitted, the contractor shall disconnect and remove the installed splices/taps and provide new acceptable splices/taps (as directed by the engineer) at no cost to the owner.
- A. Utilize manufactured or pre-engineered splices/taps specifically designed and listed for the application, including being suitable for installation underground, direct

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buried, submerged, and in wet locations. Provide outdoor exposed splices/taps also as sunlight resistant. Pre-molded, heat-shrink, and cold-shrink manufactured kits and engineer approved pre-engineered hand-wrapped tape kits shall be considered.

- B. For underground splices/taps of stranded wiring #10 AWG and smaller and solid wiring #8 AWG and smaller only, splices/taps may be made as follows. Permanently electrically connect conductors by either of the following options:

- 1) Twist conductors together then solder conductors. Utilize suitable pressure type wire nut connectors with integral water repellent non-hardening sealant (Ideal #60 "DB Plus" or approved equal) to mechanically bind the soldered splice/tap and tightly over wrap with vinyl insulating tape.
- 2) Splice/tap conductors with suitable insulated crimp-on connectors and tightly over wrap with vinyl insulating tape.

Once electrically connected, embed splices/taps in sealant compound. Utilize only engineer approved hardening flexible sealant (i.e. "bondo" traffic detector loop style sealant; contact the engineer for information and submit shop drawings for approval). Place sealant (uncured liquid) in a suitable container, immerse splices/taps in sealant in the container, and rigidly support splices, taps, and conductors in place until sealant has set.

- C. Self-sealing wire nuts (used alone and/or when over wrapped with vinyl insulating tape) are not an acceptable substitute for splices/taps as specified in items "A" and "B" above.

- 6.9 Splices, taps, and connections (and associated materials) as manufactured by Burndy, Elastimold, G&W, Homac, Ideal, IlSCO, Mac Products, O-Z/Gedney, Plymouth, Raychem, Scotch/3M, and Thomas and Betts/Blackburn (or approved equal) shall be considered.

## 7. GROUNDING MATERIALS

- 7.1 Provide all material used for grounding of non-ferrous copper. Aluminum is not acceptable, unless specifically indicated on the drawings.
- 7.2 Provide all driven (made) grounding rod electrodes of copper or copper clad steel, minimum 19 mm (3/4") diameter by 3.0 m (10'0") long.
- 7.3 Provide all grounding conductors in accordance with the section of this specification "Conductors and Cable (600 V)", except as follows. Grounding conductors may be insulated or bare, except as follows. Wherever grounding conductors #6 AWG and smaller are insulated, provide insulation colored green. Provide "isolated" grounding conductors as insulated only (green with yellow tracer). Provide grounding conductors run in raceway/cable with wiring as insulated only (bare conductors are not permitted for grounding conductors run with wiring, except cable wiring methods permitted elsewhere in the specifications where insulated grounding conductors are not available).
- 7.4 Provide all grounding connections as per the section of this specification "Splices and Taps", except as modified below. Grounding connections do not require insulation.

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- 7.5 For wiring #4 AWG and larger, provide all grounding connections utilizing exothermic weld process (Erico/Cadweld, Thermoweld, Thomas & Betts, or approved equal). Crimp-on compression type connectors may be used only where available exothermic weld process connection configurations do not correspond to combinations and arrangement of conductors to be connected. Bolted type connectors are not permitted, except where available exothermic weld process and crimp-on compression connector configurations do not correspond to combinations and arrangement of conductors to be connected. Where equipment is provided with factory installed lugs, #4 AWG and larger wiring may terminate directly at factory lugs.
- 7.6 Utilize only exothermic weld process connections for all concealed grounding connections (compression, mechanical, and other grounding connections are not permitted concealed). Where available exothermic weld process connection configurations do not correspond to combinations and arrangement of conductors to be connected in concealed locations, utilize combinations and arrangement of conductors necessary to facilitate exothermic weld process connections and extend from the concealed connection location to an accessible location where crimp-on compression or bolted type connections may be utilized (as permitted above).
- 7.7 Accessible connections of wiring #6 AWG and smaller to piping and similar materials/equipment may utilize multiple-bolt type ground clamps. Accessible connections of wiring #6 AWG and smaller to driven (made) grounding rod electrodes may utilize one-piece, single bolt "acorn" type ground clamps.
- 7.8 Provide conduit grounding bushings of galvanized malleable iron with integral screw pressure connector or provisions to accept factory or field installed lug where required.
8. IDENTIFICATION, NAMEPLATES, AND TAGS
- 8.1 Provide all new electrical equipment with engraved three (3) layer laminated plastic nameplates describing the equipment, load/device served, ratings, circuit(s) feeding the equipment, etc. as indicated below. Provide engraved plastic nameplates for existing electrical equipment where modified or connected to as part of this project or where specifically indicated on the drawings. Provide these engraved plastic nameplates in addition to any code required or manufacturers' standard nameplates.
- 8.2 Provide engraved plastic nameplates for all electrical equipment, including, but not limited to, safety switches, enclosed circuit breakers, branch panels, distribution panels (including branch circuit breakers and circuit breaker spaces), transformers, any equipment containing fuses, power outlets, thermal overload switches, contactors, time clocks, photocells, meter sockets, modular meter centers, fire alarm equipment and devices, lighting controllers, dimming cabinets, capacitors, snow melting equipment, generators, motor control centers, motor controls (starters, variable frequency drive [VFD] units, etc.) where furnished by the electrical contractor, high voltage equipment, etc. (where applicable). Provide engraved plastic nameplates for all receptacles and switches where dedicated to serving specific equipment. Provide engraved plastic nameplates for convenience receptacles (only where indicated on the drawings).
- 8.3 Secure engraved plastic nameplates with suitable screws or rivets, self-adhesive nameplates are not acceptable. Provide engraved plastic nameplates with white letters on black

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background, unless indicated otherwise. Provide engraved plastic nameplates with 6.5 mm (1/4") minimum lettering, unless indicated otherwise. Provide engraved plastic nameplates on the front and/or cover of the equipment plainly visible when the cover (where applicable) is closed, unless indicated otherwise.

- 8.4 Submit shop drawings showing proposed sizes (overall and lettering sizes) and exact proposed wording (including exact arrangement of wording) of all engraved plastic nameplates for review and approval.
- 8.5 Provide all engraved plastic nameplates in accordance with the following example. Equipment names are the alphanumeric designation for equipment indicated on the drawings (i.e. "MDP", "PP1", "EF-1", etc.). Equipment descriptions identify the equipment in "plain English" (see example). Indicate the operating voltage of the equipment, including phase and wires (see example). Where equipment includes overcurrent devices (i.e. main breaker panels, fused switches, enclosed circuit breakers, etc.) show the appropriate amperes on the engraved plastic nameplate. Where equipment does not include overcurrent devices (i.e. main lug panels, unfused switches, contactors, transformers, etc.) show the amperes of the overcurrent device protecting the circuit serving the equipment. Remarks include information as described below.

EXAMPLE ENGRAVED PLASTIC NAMEPLATE WORDING

Equipment Name (use 10 mm (3/8") lettering):	<b>PP1</b>
Equipment Description:	POWER PANEL
Equipment Voltage, Phase, Amperes:	120/208V-3PH-4W, 100A
Remarks:	FED FROM MDP - CCT. 4

- A. Branch Panel: Provide engraved plastic nameplate showing panel name and use (description) as indicated on the single line diagram and/or respective panel schedule. Remarks indicate the panel and circuit number or transformer feeding the panel.
- B. Distribution Panel: Provide "master" engraved plastic nameplate on the front cover showing information as indicated above for branch panels. For multiple section panels, locate master nameplate on the section containing the main breaker or incoming line main lugs. Remarks indicate the panel and circuit number or transformer feeding the panel (i.e. sub-distribution panel) or indicate "Service Disconnect" if a service entrance distribution panel. Provide additional nameplates for all branch circuit breakers and circuit breaker spaces (see below).
- C. Branch Circuit Breaker in Distribution Panel: Provide engraved plastic nameplate for each new circuit breaker within a distribution panel (including breakers in existing panels connected to as part of this project). Show the name and description of equipment/load fed. Voltage and phase are not required on these nameplates. Amperes are not required on these nameplates if the rating is clearly and visibly indicated on the circuit breaker. Where adjustable trip circuit breakers are used, show the proper ampere setting on this nameplate. Remarks indicate the approximate location of the equipment/panel served. Where the distribution panel includes a hinged overall cover door, provide these nameplates mounted inside the hinged door.
- D. Circuit Breaker Space in Distribution Panel: Provide engraved plastic nameplate for each circuit breaker space within a new distribution panel. Show the word "SPACE"

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and the maximum circuit breaker poles and frame size ampere rating. Equipment name, description, voltage, and remarks are not required on these nameplates. Where the distribution panel includes a hinged overall cover door, provide these nameplates mounted inside the hinged door.

- E. Safety Switch/Enclosed Circuit Breaker: Provide engraved plastic nameplate with the name and description of equipment/load fed. Remarks indicate the panel and circuit number or transformer feeding the switch/breaker. Ampere rating may be omitted if the proper rating is clearly indicated on the switch/breaker and is visible with the cover closed. Where fusible switches are used, show the fuse ampere rating. Where adjustable trip circuit breakers are used, show the proper ampere setting.
  - F. Fusible Device: On the inside cover of each fused device, provide an engraved plastic sign indicating the proper fuse size (as indicated on the drawings or otherwise required). Provide nameplate reading, "USE \_\_\_A FUSE ONLY" (fill in the proper fuse rating).
  - G. Transformer: Provide engraved plastic nameplate with the name and description of equipment/load fed. Show both the primary and secondary voltages and phase as well as the transformer kVA rating. Ampere ratings are not required. Remarks indicate the panel and circuit number feeding the transformer.
  - H. Metering: Wherever new metering equipment is installed (including meters, meter sockets, meter boards, digital panel metering units, etc.), provide engraved plastic nameplate showing panel name(s) served by the meter as indicated on the single line diagram and customer buying electricity (description) as verified with the owner. Remarks indicate the panel and circuit number or transformer feeding the panel (or indicate "Fed From Service" if a utility meter). Show service voltage and phase of the metered feeder (not necessarily the meter voltage). For transformer rated metering installations, show current transformer (CT) ratio in place of ampere rating (i.e. "400:5 CT"). For self-contained metering (without CT's), show ampere rating of the metered feeder.
- 8.6 Provide engraved plastic nameplates for power outlets, thermal overload switches, and for receptacles and switches where dedicated to serving specific equipment. Show the equipment served, the voltage and ampere rating, and the circuit feeding the equipment. Utilize 3.2 mm (1/8") high minimum lettering. Provide as per the following example:

Equipment Name and Description:	MO-1 MICROWAVE OVEN
Equipment Voltage and Amperes:	120V, 20A - PP1-12

- 8.7 Where specifically indicated on the drawings only, provide engraved plastic nameplates for convenience receptacles showing the voltage and ampere rating and the circuit feeding the receptacle. Utilize 3.2 mm (1/8") high minimum lettering. Provide as per the following example:

Equipment Voltage and Amperes:	120V, 20A
Equipment Circuit:	PP1-14

- 8.8 Provide engineer approved wrap-around adhesive or tube type wire tags or markers for all conductors, except conductors in feeders tagged as indicated below. Provide tags/markers



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indicating the panel or device where the wiring originates and the conductor circuit number (or other identifying number/letter/designation unique to the conductor). Tag/mark neutral and grounding conductors with the respective circuit number(s) of the corresponding phase conductor(s).

- 8.9 Provide engineer approved tags for all panel feeders (regardless of ampere rating) and other circuits (600 V and less) rated 100 A and larger, at both ends and at all intermediate junction and pull boxes. Provide tags indicating the circuit designation or equipment served, panel name and circuit number (or other source of feeder), and stating the voltage, phase, and amperes of the circuit. Provide tag wording and layout similar to engraved plastic nameplates as indicated above.
- 8.10 Where any conductor size differs from the conductor size normally expected for the respective overcurrent device (for any reason, whether specified or not, including voltage drop, NEC "tap rule" application, ampacity de-rating, etc.), provide engineer approved tags at the point where the wiring terminates at the overcurrent device reading, "WIRING IS ADJUSTED FOR VOLTAGE DROP/TAP RULE/DE-RATING, USE MAXIMUM \_\_\_A FUSE/CB" (indicate the proper reason for the adjustment and fill in the proper overcurrent device ampere rating). For feeders, this information may be included on the tags specified above.
- 8.11 Provide engineer approved plastic tags for all primary feeders (over 600 V) identifying the feeder number/designation and service voltage. Provide feeder numbers and exact tag configuration and information as designated by the owner and/or engineer during construction. Apply tags after applying cable fire protection tape, where applicable.
- 8.12 Provide all new and existing branch panels (where connected to or modified as part of this project) with accurate and descriptive typewritten circuit directories. For existing panels, provide directories including all modifications as part of this project as well as all previous "penciled in" changes and information. Actual tracing and identifying of existing circuits is not required, unless specifically indicated on the drawings. Submit photocopies of circuit directories as part of as-built record documents.
- 8.13 Provide all new electrical equipment with all caution, danger, and warning signs or indications required by any applicable regulation, code, standard, or manufacturer's recommendation (provide as listed where applicable and refer to specifications section "Regulations and Codes" of specifications division 16100, General Electrical). This includes, but is not limited to NEC Articles 100, 110, 200, 230, 250, 450, 490, 504, 513, 516, 550-552, 585, 620, 647, 665, 669, 690, 692, 700, 705, etc., as applicable.
- 8.14 Identify conductors in complete accordance with the NEC and as indicated below (including identifying "high-leg", grounding, and grounded (i.e. neutral) conductors, where applicable). For conductors #6 and smaller, identify by natural insulation color. For conductors #4 and larger (and for cable wiring methods where applicable colors are not readily available from cable manufacturers), identify by natural insulation color or by a 155 mm (6") long (minimum) band of colored vinyl electrical tape on conductors at all terminations and in all boxes and enclosures. Where "tracers" are required, identify by natural insulation color including narrow stripes of the tracer color. Where conductors including tracer stripes are not readily available, provide a 25 mm (1") band of tape (apply over and in the center of the 55 mm (6") band of tape, where applicable) of the tracer color at all terminations and in all boxes and enclosures.

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- 8.15 Identify phases of all conductors where more than one phase conductor is present (in raceways, cables, boxes, enclosures, etc.) with methods as indicated above. Utilize standard color-coding throughout the project as follows:

### 120/208/240 V SYSTEM

A-phase	Black
B-phase	Red (utilize orange if 120/240V-3PH-4W midpoint grounded delta (i.e. "high-leg") system)
C-phase	Blue
Neutral	White
Ground	Green

### 277/480 V SYSTEM

A-phase	Brown
B-phase	Orange (utilize purple where orange is used for 120/240V-3PH-4W delta system above)
C-phase	Yellow
Neutral	White with brown tracer(s)
Ground	Green

Isolated ground conductors (any system): Green with yellow tracer(s)

### OVER 600 V SYSTEMS

Utilize multiple 51 mm (2") wide bands of colored tape to identify phases. Utilize yellow for 5 kV nominal, red for 15 kV nominal, and orange for 25/35 kV nominal.

A-phase	Single band
B-phase	Two (2) bands
C-phase	Three (3) bands

- 8.16 The electrical contractor shall provide new OSHA approved "DANGER - HIGH VOLTAGE" signs on all doors which directly enter any room containing exposed live parts or containing new or existing equipment operating at over 600 V (where connected to or modified as part of this project). Provide new signs even if existing signs are present (except that new signs are not required where existing signs are OSHA approved type complying with *current* OSHA standards).

## 9. LOCKS AND KEYS

- 9.1 Provide all locks for lighting and power panels, fire alarm and signaling cabinets and all other electrical systems or locked apparatus with keys which are alike.

## 10. RECEPTACLES AND SWITCHES

- 10.1 Provide all receptacles and switches as industrial and specification grade, totally enclosed in non-flammable and heat resistant heavy-duty thermoset or thermoplastic case, with terminal screws on the side of the case. Pigtail conductor connections are not permitted (except for specialty devices where side terminal screws are not available options in the manufacturer's catalog), unless specifically indicated otherwise. Provide color as selected and approved by the owner and architect.

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- 10.2 Provide receptacles as duplex, parallel blade, side wired, three (3) wire, grounding type, 20 A, 120 V, and listed as "tamper-resistant", unless specifically indicated otherwise on the drawings. Listed combination receptacle and separable snap-in wiring terminal assemblies (Hubbell "SNAPConnect" style, Pass & Seymour "PlugTail" style, or approved equal) may be used and may utilize pigtail connections on the wiring terminal assemblies.
- 10.3 Provide weatherproof receptacles listed as weather-resistant type and mounted in a weatherproof box with gasket and single spring-hinged weatherproof-while-in-use cover over both receptacle positions.
- 10.4 Provide receptacles at accessory buildings (at or below grade), bathrooms (including rooms containing bathtubs or showers), boat hoists, boathouses, crawl spaces, dishwashers, garages, janitor closets, kitchens, kitchenette counters, laundry areas, outdoors, rooftops, unfinished basements, wet locations, within 6'0" of any sink, and as indicated on the drawings or required by the NEC with integral ground fault circuit interrupter (GFCI) protection for personnel with trip characteristics as per the NEC and UL standards. Utilize only weather-resistant type receptacle mounted in a weatherproof outlet box with single spring-latched weatherproof-while-in-use cover for boat hoists and in all outdoor, rooftop, and wet locations. Feed-through protection of standard type receptacles from other GFCI receptacles is not acceptable (unless specifically indicated otherwise on the drawings). Protection of standard type receptacles in readily accessible locations from GFCI circuit breakers is not acceptable (see below for inaccessible receptacles). For inaccessible receptacles (locations which are not readily accessible as per the NEC, for example where located behind equipment, appliances, or obstacles) the use of GFCI type receptacles is prohibited and protection of standard type receptacles from GFCI circuit breaker must be used (identify receptacles as protected as per the NEC). Provide compliant GFCI protection wherever required by the NEC whether indicated on the drawings or not.
- 10.5 Where indicated on the drawings, provide isolated ground type receptacles with the receptacle grounding terminal electrically isolated and insulated from the receptacle mounting yoke. Where indicated on the drawings, provide with integral transient voltage surge suppressor (TVSS, with integral light emitting diode (LED) indicating integrity of TVSS protection) with TVSS components rated 150 V, 210 J (at 10 x 1,000  $\mu$ s), and 13 kA (minimum) and complying with UL-1449. Provide all wiring serving isolated ground receptacles with separate equipment and isolated grounding conductors as per specifications section "Grounding" of specifications division 16200, General Electrical. Where isolated ground type receptacles are shown in nonmetallic raceways or nonmetallic boxes, either ground the metal receptacle yoke (in addition to grounding the receptacle ground terminal) with the equipment (raceway) grounding conductor (utilizing methods approved by the NEC) or substitute a standard (i.e. non-isolated-ground) type receptacle (but with TVSS where specified) so the receptacle yoke is grounded by the isolated ground conductor, at the contractor's option.
- 10.6 Provide wall switches as single pole, three-way, or four-way as applicable, heavy duty flux tumbler type, UL "T" rated, specification grade, and rated 20 A, 277 V and 120 V.
- 10.7 Provide horsepower rated single-pole thermal overload switches (manual motor starters, O/L switches, etc.) with thermal overload heater element coordinated with equipment served. Where overload protection is not required (where the switch acts only as disconnecting means) provide overload heater element rated in excess of the branch circuit breaker amperes.

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- 10.8 For all switches where locking provisions are required by Code or indicated on the drawings and for all thermal overload switches, provide a suitable handle locking guard capable of visibly padlocking in the open or closed position (with switch handle position visible when locked).
- 10.9 Provide dimmer switches of thin profile slide type ("off" when slider is in the lowest position), Lutron #NT series (or approved equal by Hubbell or Leviton), unless indicated otherwise. Dimmer switches of the rotary type, with raised profile (with raised cooling fins), and/or with on/off toggle separate from slider are not acceptable. Provide with full wattage rating as indicated on the drawings, do not "de-rate" by removing cooling fins or heat sink sections (unless specifically indicated on the drawings). Where multiple dimmer switches or dimmer switch(es) along with standard type switches (single pole, three-way, and four-way) are shown grouped together on the drawings, gang switches together with a single overall cover plate (conform with NEC Article 404.8(B) "Voltage Between Adjacent Switches", where applicable). Utilize special cover plates based on the combination of switches involved. Where ganged with dimmer switches, utilize single pole, three-way, and four-way switches of the slide type with appearance and manufacturer matching dimmer switches.
- 10.10 For all receptacles at any location in hospitals and in patient care and/or treatment areas in other occupancies (doctors/nurses offices, athletic training, first aid rooms, etc.) provide receptacles as hospital grade (in addition to requirements above) and provide wiring feeding the receptacles complying with NEC Article 517.13

## 11. SAFETY SWITCHES

- 11.1 Provide all safety switches (disconnect switches) of the quick-make and quick-break type, with contacts not marked or shielded, designed to function if the operating spring fails or is removed, with mechanical interlock so operation is impossible when the cover is open (provide means to manually bypass/defeat the interlock), with provisions for padlocking in both the open and closed positions, and of the heavy duty type. Provide switches with voltage ratings equaling or exceeding the operating voltage. Provide indoor switches with NEMA-1 enclosures. Provide outdoor switches with NEMA-3R enclosures. Where NEMA-4X enclosures are specifically indicated on the drawings only, provide of the stainless steel type only.
- 11.2 Provide fuse clips in fusible switches to facilitate fuses as per the section of this specification "Fuses". Provide suitable "rejection" type clips to prevent replacing fuses with short circuit ratings lower than specified.
- 11.3 Provide safety switches with ground busses. Where neutral conductor is present, provide safety switches with separate neutral busses (with provisions for bonding, bond where required by the NEC).
- 11.4 For all safety switches on the load side of variable frequency drive (VFD) units, provide safety switches with integral "electrical interlock" auxiliary contacts (one (1) N.O. and one (1) N.C., minimum) which "break" before safety switch opens. Provide two (2) #14 AWG interlock conductors run (in raceway with line side power conductors) from auxiliary contact to VFD unit. The VFD supplying contractor shall connect interlock wiring at VFD

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unit to shut down VFD unit if safety switch is opened to prevent operating VFD without load connected.

- 11.5 For safety switches serving elevators, provide safety switches with integral "electrical interlock" auxiliary contacts (one (1) N.O. and one (1) N.C., minimum) which "break" before switch opens. Provide two (2) #14 AWG interlock conductors run (in raceway with load side power conductors) from auxiliary contact to elevator controller. Elevator contractor shall connect interlock wiring at elevator controls.
- 11.6 Equipment as manufactured by Eaton, General Electric, Siemens, and Square-D (or approved equal) shall be considered.

### 12. FUSES

- 12.1 Provide an NEC cartridge fuse for each fuse-gap in the work. Furnish three (3) spare fuses of the rating installed to the owner for each fused device. Specifications are based on equipment as manufactured by Cooper/Bussman. Equipment as manufactured by Ferraz Shawmut and Littlefuse (or approved equal) shall be considered.
- 12.2 Provide fuses of the dual element time delay, current limiting, and non-renewable type with voltage rating not less than the operating voltage and coordinated with the respective fuse clips and with short circuit rating of 200,000 A. Provide fuses as class "RK1" (600 A and less, Cooper/Bussman #LPN/S-RK series or approved equal) or class "L" (over 600 A, Cooper/Bussman #KRP-C series or approved equal). Class "CC" fast acting (Cooper/Bussman #LP-CC series or approved equal) or time delay (Cooper/Bussman #KTK-R series or approved equal) fuses, as recommended by manufacturer, are permitted for control applications.

### 13. CIRCUIT BREAKERS

- 13.1 This section applies to all circuit breakers installed within or in conjunction with branch and distribution panels, enclosed circuit breakers, contactors, starters, and any other electrical equipment, unless indicated otherwise.
- 13.2 Provide all circuit breakers of the molded case type unless specifically indicated otherwise. Provide readily removable from the front of panels and equipment without disturbing adjacent units, having quick-make and quick-break toggle mechanisms and non-fusible contacts, having inverse time and short circuit characteristics, which trip free on overload or short circuit so that they cannot be held closed on overload, clearly indicating whether they are in the open, tripped, or closed position. Provide automatic release obtained through the medium of a bimetallic thermal type element (ambient compensated) engaged in the releasing latch of the breaker or mechanism.
- 13.3 Provide circuit breakers in branch and distribution panels with short circuit ratings as indicated in the respective equipment specifications. Provide circuit breakers as part of enclosed circuit breakers, contactors, starters, and any other electrical equipment with short circuit ratings not less than the short circuit rating of the first overcurrent device on the line side of the breaker, unless indicated otherwise on the drawings.

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- 13.4 Provide field-installed handle locking devices for all circuit breakers not requiring switch control, for all circuit breakers feeding emergency lighting equipment (including battery equipment) and fire alarm controls, and for all circuit breakers fed from an emergency generator system (where applicable).
- 13.5 Provide 15 A and 20 A circuit breakers "SWD" and "HID" rated. Provide branch panel (250 V and less) circuit breakers rated 70 A and less as "HACR" rated. Provide enclosed circuit breakers and circuit breakers in distribution panels rated 250 A and less as "HACR" rated.
- 13.6 For all 120 V, 20 A and 120 V, 15 A circuits (including multi-wire branch circuits feeding 120 V loads) serving any new or existing outlets (receptacle outlets, lighting outlets, fan outlets, equipment outlets, utilization outlets, etc.) in any dwelling unit family room, dining room, living room, parlor, library, den, bedroom, sunroom, recreation room, closet, hallway, or similar room or area, provide branch circuit breakers of the arc fault circuit interrupter (AFCI) type. This does not apply to circuits rated 208 V and greater or circuits rated 30 A and greater. For the purposes of this section, bedrooms include all bedrooms, hotel/motel guest rooms, dormitory rooms, and any other room capable of being converted to or used as a bedroom or for sleeping. Provide as NEC approved and listed for the purpose. Provide whether indicated on the drawings (including panel schedules) or not, include all costs in bid.
- 13.7 Provide all circuit breakers over 250 A of a type with interchangeable trip units. Provide all circuit breakers rated 1,000 A or larger and operating at over 250 V with integral ground fault protection for equipment. Unless alternative means for arc energy reduction are specifically indicated otherwise on the drawings or specifications, provide all circuit breakers rated 1,200 A or larger with an individual energy-reducing maintenance switch with local status indicator.
- 13.8 Short Circuit, Coordination, and Arc Flash Report: Where circuit breakers include or facilitate adjustable settings, adjust and set as follows (short circuit, coordination, and arc flash report is NOT required if all new circuit breakers are fixed with no adjustable settings). Set adjustable continuous current settings (where applicable) to ratings shown on drawings. For adjustable instantaneous, short time, and ground fault settings (where applicable), the electrical contractor is responsible for (include all costs) a short circuit, coordination, and arc flash study performed by the respective circuit breaker manufacturer. Set breakers and label all associated electrical equipment as per this study. Provide study in accordance with applicable ANSI and IEEE standards. Gather all information required by the manufacturer to perform this study. Submit a written report of the study to the engineer for review prior to releasing equipment for manufacture. The coordination study may be limited to a minimum of coordinating each adjustable setting circuit breaker with the nearest line side overcurrent device directly feeding the breaker and all nearest load side overcurrent device(s) fed directly by the breaker. The short circuit study and arc flash study is required for all electrical equipment containing new circuit breakers which include or facilitate adjustable settings, for all equipment fed from ("downstream of") new circuit breakers which include or facilitate adjustable settings, for all equipment which feeds ("upstream of") new circuit breakers which include or facilitate adjustable settings back to all utility and/or generator source(s) (except that other unrelated equipment which branches off of "upstream" equipment is not required to be included in the study, unless specifically indicated otherwise), and as otherwise required to complete the coordination study and confirm proper settings. Setting adjustable circuit breaker settings to the minimum or

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factory "default" settings (i.e. as shipped from the factory) is not acceptable. Where the short circuit, coordination, and arc flash report is not submitted by the contractor or where devices are not set accordingly (for example, including where devices are set to the minimum or factory default settings) the electrical contractor may be held liable for nuisance tripping which may occur.

### 14. ENCLOSED CIRCUIT BREAKERS

- 14.1 Provide each enclosed circuit breakers consisting of a molded case circuit breaker, with a trip rating as indicated on the drawings, with provisions for padlocking in both the open and closed positions, within a listed enclosure manufactured for the purpose of housing a circuit breaker. Provide indoor breakers with NEMA-1 enclosures. Provide outdoor breakers with NEMA-3R enclosures.
- 14.2 Provide circuit breakers (including short circuit ratings) as specified elsewhere in this specification. Provide circuit breakers of the bolt-on type.
- 14.3 Provide enclosed circuit breakers with ground busses. Where neutral conductor is present, provide safety switches with separate neutral busses. Provide neutral bus with provisions for bonding and bond where required by the NEC.
- 14.4 Equipment as manufactured by Eaton, General Electric, Siemens, and Square-D (or approved equal) shall be considered.

### 15. BRANCH PANELS

- 15.1 Provide branch panels (panel boards) of dead front completely enclosed safety type construction, listed (with all components bearing labels), of a type suitable for use as service entrance, and containing thermal-magnetic "bolt-on" type circuit breaker branches as per the respective schedules on the drawings.
- 15.2 Provide circuit breakers as specified elsewhere in this specification.
- 15.3 Provide cabinets consisting of code gauge galvanized sheet steel boxes of sufficient depth, width, and length to mount the panels as indicated on the drawings and to facilitate wiring, with suitable lugs for mounting panel interiors, and with wiring gutters at top, bottom, and sides of sufficient size to adequately accommodate the raceways, conductors, and cables entering and leaving (provide all gutters at least 100 mm (4")).
- 15.4 Provide panel faces with adjustable indicating type clamps and of door-in-door construction, with inner door opening over the circuit breaker section and outer door over wiring space (both secured with locks and pulls as per specifications section "Locks and Keys"), hung with heavy hinges, and with faces and doors not less than 2.7 mm (12 ga.) thick.
- 15.5 Provide metal frame circuit directory holders welded to the inside of the cabinet doors with transparent covers. Place typewritten directories in these holders.
- 15.6 Provide bus bars with ampacity as indicated on the drawings (or corresponding to main breaker, where applicable) and with all current carrying parts sized per UL 67 heat rise testing.

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- 15.7 Provide panels with copper or aluminum bus bars.
- 15.8 Provide panels with separate ground and neutral busses. Provide neutral bus with provisions for bonding and bond where required by the NEC.
- 15.9 Provide panels with 10,000 A short circuit rating (A.I.C.,  $I_{sc}$ ), unless indicated otherwise on the drawings. Provide panels fully short circuit rated, series short circuit rating of panels are not acceptable (unless specifically indicated otherwise).
- 15.10 Equipment as manufactured by Eaton, General Electric, Siemens, and Square-D (or approved equal) shall be considered.
- 15.11 Where indicated on the drawings or required by code, provide with integral factory installed transient voltage surge suppression (TVSS). Provide for all emergency panels whether shown on not on drawings.
- 15.12 Where branch wiring fed from the panel utilizes cable wiring methods (i.e. types "AC" or "MC" cables, where permitted elsewhere by the specifications) avoid visible exposed cables in electrical closets and electrical rooms by either of the following options:
  - A. Provide suitable sheet metal panel "skirt" enclosure(s) above and/or below the panel to completely enclose cable wiring methods so not more than a 300 mm (12") total length of each cable is visible. Provide skirt enclosures fabricated of galvanized sheet steel not less than 0.55 mm (26 ga.) thick.
  - B. Provide a nearby junction box for branch wiring as indicated below.
- 15.13 Where panels are flush mounted, provide an adjacent junction box for branch wiring as indicated below.

### 16. JUNCTION BOXES FOR BRANCH PANELS

- 16.1 Provide suitable junction boxes (and/or wiring troughs) for branch wiring at branch panels as follows. The electrical contractor must provide junction boxes for all flush mounted panels. The electrical contractor may utilize junction boxes (as an option to metal panel skirts) to avoid exposed visible cables in electrical closets and electrical rooms. The electrical contractor may utilize junction boxes at other locations and applications if desired, but the boxes and raceways (wherever used) must comply with all of the following requirements.
- 16.2 Locate each junction box above an accessible drop ceiling (or an access panel if ceiling is inaccessible) directly above or as close as practical to the panel. Where junction box is installed to satisfy requirements to hide cable wiring methods, locate outside of the electrical closet/room or inside the closet/room at a perimeter wall so there are no visible cables in the closet/room (except that not more than 300 mm (12") total visible length of each cable is permitted leaving the junction box).
- 16.3 Provide junction boxes and raceways between boxes and panel as indicated below.



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<u>Panel Size (Branch Cct. Poles)</u>	<u>Junction Box Min. Dimensions</u>	<u>Quantity and Size of Conduits</u>
43-Poles & Over (All Double panels)	48"W x 8"H x 8"D (1.2m x 205mm x 205mm) *	(8) 53 mm (2")
31-to 42-Poles	24"W x 8"H x 8"D (0.6m x 205mm x 205mm)	(4) 53 mm (2")
19-to 30-Poles	24"W x 6"H x 6"D (0.6m x 155mm x 155mm)	(3) 53 mm (2")
18-Poles and less	18"W x 6"H x 6"D (460mm x 155mm x 155mm)	(2) 53 mm (2")

\* Two (2) 24"W x 8"H x 8"D (0.6 m x 205 mm x 205 mm) junction boxes may be substituted. Provide (2) 78 mm (3") conduit nipples between the junction boxes.

- 16.4 Adjust wiring sizes between each junction box and panel in accordance with NEC de-rating factors. Utilize #8 AWG wiring for branch circuits rated 25 A or 30 A. Utilize #6 AWG wiring for branch circuits rated over 30 A but less than 60 A. Coordinate routing of wiring between junction box and panel with the engineer during construction for all circuits rated over 30 A. Where wiring sizes change due to de-rating considerations, splice wiring in the junction box.
- 16.5 Do not pass the incoming panel feeder and any branch circuits rated 60 A and larger through junction boxes, run this wiring directly into panels. Do not terminate any branch wiring conductors (including grounding conductors associated with each branch circuit) in junction boxes. Terminate conductors only at circuit breakers, ground bus, and neutral bus in panels. Do not splice conductors in junction boxes, except straight-through splicing of two (2) conductors as provided above for de-rating.
- 16.6 Bond each junction box to the panel enclosure with a grounding conductor run in one of the raceways between the panel and junction box. Provide bonding conductor not smaller than the grounding conductor for the panel feeder.

### 17. DISTRIBUTION PANELS

- 17.1 Distribution panel (distribution panel boards and switchboards) specifications are based on Square-D "I-Line" type. Additional equipment including Square-D #QED type, Eaton "Pow-R-Line" type, General Electric "AV-Line" type and "Spectra" series, and Siemens "P-series" (or approved equal) shall be considered.
- 17.2 Provide distribution panels of dead front completely enclosed safety type construction, listed (with all components bearing labels), and of a type suitable for use as service entrance.
- 17.3 Provide thermal-magnetic branch circuit breakers featuring "bolt-on" type modular mounting, facilitating mounting of breakers regardless of breaker frame sizes or poles.
- 17.4 Provide circuit breakers as specified elsewhere in this specification.
- 17.5 Where new "spaces" or "provisions" for circuit breakers are indicated on the drawings or specifications, include all circuit breaker mounting brackets, hardware, bus bar straps, screws, and any other material, equipment, and accessories required to install circuit breakers in the future (install in panel spaces). Provide so the only necessary component not furnished as part of provisions is the circuit breaker(s) themselves.

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- 17.6 The quantity of provisions (of each respective frame size) specifically indicated on the drawings is the minimum acceptable. If necessary, provide additional branch distribution sections to provide the specified minimum quantity. After satisfying specified minimums, provide additional provisions (of 100 AF, 225/250 AF, and/or 400 AF frame sizes; in any combinations at the manufacturer's/contractor's discretion) so all remaining available circuit branch breaker mounting space in the panel (for the full height of the panel enclosure) consists of provisions.
- 17.7 Provide all compartments (and all main and branch circuit breakers and other equipment therein) completely accessible from the front, unless otherwise indicated on the drawings (regardless if panels are shown against a wall or free-standing).
- 17.8 Provide enclosure consisting of code gauge steel box(es) of galvanized sheet steel of sufficient dimensions to mount panels and to facilitate wiring.
- 17.9 Provide bus bars with ampacity as shown on the drawings (or matching main breaker, where applicable) and with all current carrying parts sized per UL 67 heat rise testing.
- 17.10 Provide panels with copper or aluminum bus bars.
- 17.11 Provide panels with separate ground and neutral busses. Provide neutral bus with provisions for bonding and bond where required by the NEC.
- 17.12 Provide bus bars braced to withstand 100,000 A short circuit current. Provide panels with 100,000 A short circuit rating (A.I.C.,  $I_{sc}$ ), unless indicated otherwise on the drawings (rating on drawings does not apply to bus bracing, provide bracing as indicated above). Provide panels fully short circuit rated, series short circuit rating of panels is not acceptable.
- 17.13 Identify each branch circuit breaker individually with an engraved plastic nameplate as indicated in the section of this specification "Identification, Nameplates and Tags".
- 17.14 Where indicated on the drawings, provide panels with integral factory fitted electronic metering units with appropriate metering transformers. Provide metering units to meter current (in all three phases), voltages (phase-to-phase and phase-to-neutral/ground in all three phases), power (kW), apparent power (kVA), energy consumption (kWH), power factor, peak demand power (kW peak), and harmonic THD and K-factor, and featuring true RMS metering. Provide meter with communications capability via RS-485 port and via Ethernet (10/100 Base-T UTP) communications card. Provide a telephone/data outlet (see symbol list on drawings) at panel (whether shown on the drawings or not). Provide metering units as Square-D/Power Logic #PM820 (with #PM8ECC communications card, Eaton, General Electric, Siemens, or approved equal).
- 17.15 Where indicated on the drawings or required by code, provide equipment ground fault protection for main and/or branch circuit breakers.
- 17.16 Where indicated on the drawings or required by code, provide with integral factory installed transient voltage surge suppression (TVSS). Provide for all emergency panels whether shown on not on drawings.

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17.17 Where draw-out construction or draw-out circuit breakers are shown on the drawings or otherwise specifically noted, provide panels accordingly. Refer to the section of this specification "Unit Substation" for information.

### 18. DRY TYPE TRANSFORMERS

18.1 Provide dry type transformers (indicated "AA" on the drawings) with primary and secondary voltages, connections (i.e. single phase, three-phase wye, three-phase delta, etc.), and kVA rating as indicated on the drawings.

18.2 Provide with 150 degrees C temperature rise above 40 degrees C ambient. Provide all insulating materials in accordance with NEMA St20-1972 standards for a 220 degree C listed component recognized insulation system and provide transformers listed for the specified temperature rise. The maximum temperature of the top of the enclosure may not exceed 50 degrees C rise above 40 degrees C ambient.

18.3 Provide with primary full capacity taps, a minimum of two (2) 2.5% taps above and two (2) 2.5% taps below rated voltage.

18.4 Provide coils of continuous wound construction impregnated with non-hydroscopic, thermosetting varnish. Provide copper or aluminum coil windings.

18.5 Provide core constructed of high grade, grain oriented, non-aging silicon steel laminations with high magnetic permeability, featuring low hysteresis losses and low eddy current losses, and constructed to maintain magnetic flux densities well below the saturation point. Provide core laminations clamped together with structural steel angles. Provide the core and coil fastened to the enclosure base utilizing an appropriate engineered permanent fastening and vibration isolating/absorbing system (i.e. including rubber mounts). Metal-to-metal contact of any kind between the core and coil and the enclosure is not acceptable. Isolating systems requiring the complete removal of all fastening devices are not acceptable. Provide core and all ferrous parts suitably protected to resist corrosion by painting or plating.

18.6 Provide core visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable NEMA, IEEE, and ANSI standards.

18.7 Provide transformers mounted in heavy gauge, sheet steel, ventilated enclosures designed for floor mounting or designed for both floor and wall mounting (wall mounting only is not acceptable, unless specifically indicated on the drawings). Provide ventilating openings to prevent access to live parts in accordance with UL, NEMA, and NEC standards (specifically including NEC Articles 110.27 and 450.8 [and 110.31(B)(1) if over 600 V]) for ventilated enclosures in locations accessible to unqualified persons (whether installed in such locations or not), including the use of an enclosure bottom plate (open bottom is not acceptable under any circumstance). Include custom/special enclosures or enclosure modifications to satisfy this requirement (where enclosures are installed which not meeting this requirement [without prior written approval], the contractor shall remove the enclosure and provide a new acceptable enclosure at no cost to the owner).

18.8 Provide the entire enclosure degreased, cleaned, phosphatized, primed, and finished with gray baked enamel.

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- 18.9 Provide manufacturer guaranteed sound levels not exceeding 45 dB.
- 18.10 For transformer coils rated 600 V and less, provide basic impulse level (B.I.L.) rating as per applicable industry standards. For transformer coils rated over 600 V, provide 95 kV B.I.L. rating.
- 18.11 Provide all transformers rated 15 kVA and larger as energy efficient NEMA TP1 rated. Provide all transformers rated 480V-3PH-3W to 120/208V-3PH-4W and 500 kVA and less with UL K-13 rating, minimum, unless specifically indicated otherwise.
- 18.12 Where transformers are indicated as part of a unit substation, provide with suitable coordinated flanges for assembly to high voltage and low voltage compartments. Provide all hardware, bus, connectors, etc. for complete assembly.
- 18.13 Where transformers are indicated with forced-air cooling ("AA/FA" on the drawings) provide complete with integral cooling fans, automatic fan controls, and integral control power transformer for fans. Provide forced-air cooling for increased capacity 33.3% above the base (AA) transformer rating. Provide automatic fan controls including over temperature alarm with indicating light and horn and with contacts for external monitoring. Provide nameplate reflecting fan rating.
- 18.14 Where transformers are indicated with provisions for future forced air cooling ("AA/FFA" on the drawings) provide with core and coils rated based on future addition of fans, with integral provisions for mounting future cooling fans, with blank plate in enclosure as provisions for mounting future fan controls, and provisions for connecting future control power transformer. Provide all required heat sensing equipment installed in transformer coils. Future forced-air cooling shall provide increased capacity 33.3% above the base (AA) transformer rating once fans are installed. Provide nameplate reflecting future fan rating.
- 18.15 Equipment as manufactured by Eaton, General Electric, Hevi-Duty, Siemens, and Square-D (or approved equal) shall be considered.
19. CONTACTORS AND OUTDOOR LIGHTING CONTROLS
- 19.1 INTEGRATED OUTDOOR LIGHTING CONTROLLER: Provide integrated outdoor lighting controller of the combination photocell and time clock type as shown below (unless other type(s) are specifically indicated on the drawings). Provide lighting contactors, time clocks, fusing, and remote photocells as indicated in respective sections elsewhere in this specification. Provide an engraved laminated plastic nameplate on the front cover (refer to the section of this specification "Identification, Nameplates, and Tags") describing the controller ("OUTDOOR LIGHTING CONTROLLER - 120V, 5A - CONTROLS FED FROM PP1 - CCT. 4 - SEE INSIDE FOR CONTROLLED CIRCUITS - PHOTOCELL ON ROOF AT NORTH SIDE OF BUILDING"). Describe the location of the remote photocell, where applicable. Provide engraved laminated plastic nameplates at each switch indicating the switch function and respective switch positions. Provide engraved laminated plastic nameplates at each pilot light indicating the light function. Switch/pilot light nameplates may utilize 1/8" letters. Provide a typewritten circuit directory affixed within the enclosure listing each respective contactor pole, panel, circuit number, and description of each controlled circuit. Equipment as manufactured by ASCO,

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Eaton, General Electric, Siemens, and Square-D (or approved equal) shall be considered.

- A. Combination Photocell and Time Clock Lighting Controller: Provide combination photocell and time clock controlled integrated outdoor lighting controller including two (2) 20 A, 12-pole lighting contactors (one (1) for photocell and time clock lighting and one (1) for photocell only lighting), an integral one (1) channel digital time clock, two (2) hand-off-auto (HOA) selector switches (one (1) for each lighting contactor above), suitable terminal blocks for all field wiring (including 120 VAC incoming controller power wiring, connections to remote photocell, etc.), fused (rating as per manufacturer) control power circuit, and complete factory internal wiring. Provide all components above enclosed within an overall NEMA-1 enclosure with hinged cover and locking (keyed to match branch panel keys) hasp (provide HOA switches mounted on the front cover). Provide ASCO #641AS outdoor lighting controller (or approved equal).
- B. Photocell Only Lighting Controller: Provide photocell controlled integrated outdoor lighting controller including one (1) 20 A, 12-pole lighting contactor, one (1) hand-off-auto (HOA) selector switch, suitable terminal blocks for all field wiring (including 120 VAC incoming controller power wiring, connections to remote photocell, etc.), fused (rating as per manufacturer) control power circuit, and complete factory internal wiring. Provide all components above enclosed within an overall NEMA-1 enclosure with hinged cover and locking (keyed to match branch panel keys) hasp (provide HOA switches mounted on the front cover). Provide ASCO #641S outdoor lighting controller (or approved equal).
- C. Time Clock Lighting Controller: Provide time clock controlled integrated outdoor lighting controller including one (1) 20 A, 12-pole lighting contactor, an integral one (1) channel digital time clock, one (1) hand-off-auto (HOA) selector switch, suitable terminal blocks for all field wiring (including 120 VAC incoming controller power wiring, connections to remote photocell (where applicable), etc.), fused (rating as per manufacturer) control power circuit, and complete factory internal wiring. Provide all components above enclosed within an overall NEMA-1 enclosure with hinged cover and locking (keyed to match branch panel keys) hasp (provide HOA switches mounted on the front cover). Provide ASCO #641A outdoor lighting controller (or approved equal). Where a photocell is indicated on the drawings, provide complete interconnections between controller and photocell. Where a photocell is not indicated on the drawings, provide a field jumper in place of photocell contact connection.
- D. Lighting Controller Emergency Contactor: Provide outdoor lighting controller including an electrically held emergency lighting contactor in a separate NEMA-1 enclosure to control emergency outdoor lighting. Maintain complete separation between normal and emergency source wiring as per code. Provide emergency lighting contactor consisting of a 20 A, 12-pole electrically held and electrically operated (mechanically held contactor of any type is not acceptable for emergency use) lighting contactor with all normally closed (N.C.) contacts so emergency lighting circuits energize upon loss of control voltage to this contactor. Interconnect emergency contactor with a normally closed auxiliary contact in the normal photocell controlled lighting contactor wired in series with an auxiliary contact in the generator automatic transfer switch (contact opens when generator is in the "emergency" position). Provide all interconnecting field wiring.

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- 19.2 LIGHTING CONTACTORS: Provide lighting contactors with number of poles and ampere ratings as indicated on the drawings. Provide contactors mechanically held and electrically operated with integral solid-state control modules for two (2) wire control, unless indicated otherwise. Utilize electrically held and electrically operated contactors only where specifically indicated on the drawings (and provide with not less than one (1) N.C. and one (1) N.O. auxiliary contacts). Provide contactors with silver alloy double break contacts, with all contacts rated 600 V, and with coil clearing contacts. Provide 120 VAC coil voltage, unless indicated otherwise. Provide contactors mounted in NEMA-1 enclosures, unless indicated otherwise. Provide all contacts normally open, unless indicated otherwise.
- A. Provide an engraved laminated plastic nameplate on the front cover (refer to the section of this specification "Identification, Nameplates, and Tags") describing the contactor ("OUTDOOR LIGHTING CONTACTOR - 120V, 5A - CONTROLS FED FROM PP1 - CCT. 4 - SEE INSIDE FOR CONTROLLED LIGHTING CIRCUITS - \*"). Describe the device(s) controlling the contactor and controlling device(s) location(s), where applicable. Provide a typewritten circuit directory affixed within the enclosure listing each respective contactor pole, panel, circuit number, and circuit description of each controlled circuit. Nameplate is not required for contactors integral to a lighting controller where the controller includes a similar nameplate.
  - B. Provide contactors rated 20 A as ASCO #918 series (or approved equal). Provide contactors rated 30 A and larger of the non-fusible combination type, with integral disconnect switch, Square-D Class #8903 type "S" (or approved equal). Equipment as manufactured by ASCO, Eaton, General Electric, Square-D, and Siemens (or approved equal) shall be considered.
- 19.3 TIME CLOCKS: Provide one (1), two (2), or four (4) channel time clocks, as indicated on the drawings. Provide time clocks with one (1) single pole, double throw (SPDT) contact for each respective channel (to facilitate control of mechanically held, electrically operated contactors), with digital control (electromechanical type is not acceptable), of the seven (7) day type with 365 day single and block holiday scheduling, with astronomic feature, indicating "on" or "off" condition with an illuminated light emitting diode (LED) visible with the enclosure cover open, with integral manual override capability, with integral automatically recharging nickel cadmium (NiCd) battery providing minimum 72 hour reserve power. Provide coil and contact voltage rated 120 V, unless indicated otherwise. Provide time clock with NEMA-1 metal or NEMA-3 "Noryl" enclosure, unless indicated otherwise. Provide contacts rated 20 A where directly switching branch circuit load or rated 10 A (resistive) minimum where controlling contactor(s). Utilize Tork #DZS100BP (one channel), #DZS200BP (two channel), or #K400Z (four channel) time clocks (or approved equal). Provide an engraved laminated plastic nameplate on the front cover of each time clock (refer to the section of this specification "Identification, Nameplates, and Tags") describing the time clock ("OUTDOOR LIGHTING - 120V, 5A - CONTROLS FED FROM PP1 - CCT. 4 - SEE INSIDE FOR CONTROLLED LIGHTING CIRCUITS - \*"). Describe the device(s) controlled by the time clock and controlled device(s) location(s), where applicable. Where time clock switches branch circuits directly, provide a typewritten circuit directory affixed within the enclosure listing each respective contact pole, panel, circuit number, and circuit description of each controlled circuit. Nameplate is not required for time clocks integral to a lighting controller where the controller includes a similar nameplate. Specifications are based on equipment as manufactured by Tork.

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Equipment as manufactured by Intermatic and Paragon (or approved equal) shall be considered.

- 19.4 PHOTOCELLS: Provide photocells of the utility-grade twist-lock type with integral time delay feature (nominal 3-5 s), with molded sealed infrared (IR) silicon electronic sensor and 360 J integral utility grade metal oxide varistor (M.O.V.) over-voltage surge protection, arranged to "fail-on", listed, and rated 120-305 V (suitable for 120 V, 208 V, 240 V, and 277 V operation), 1,000 W tungsten, 1,800 VA ballast, and 1,000 W LED, unless indicated otherwise. Provide a suitable twist-lock photocell receptacle and mount atop a suitable weatherproof box. Utilize Tork #5237M photocells and Tork #2223/4 photocell twist-lock receptacles (or approved equal). Provide an engraved laminated plastic nameplate at photocell twist-lock receptacles (refer to the section of this specification "Identification, Nameplates, and Tags") describing the device(s) controlled by the photocell and the circuit feeding the photocell ("SEE LIGHTING CONTROLLER IN ELECTRICAL ROOM - 120V, 5A - PP1, CCT. 4"). Nameplate may utilize 3.2 mm (1/8") letters. Specifications are based on equipment as manufactured by Tork. Equipment as manufactured by Intermatic and Paragon (or approved equal) shall be considered.

### 20. PANEL SURGE SUPPRESSION

- 20.1 Provide all new branch panels with integral factory installed transient voltage surge suppression (TVSS). Provide complete panel and TVSS UL 1449 Second Edition listed and providing TVSS protection in accordance with IEEE C62.41 and C62.45. Provide TVSS voltage and phase ratings to match panel and provide short circuit rating of 200,000 A.I.C. (minimum). Provide TVSS connecting directly to panel bus bars (on the load side of panel main circuit breaker, where applicable) and with breaker/fusing (and disconnecting means where required by code) as per the manufacturer (connecting TVSS utilizing branch circuit breakers in the panel is not acceptable). Provide panel enclosure with ample space for TVSS equipment and associated wiring without reducing wiring space/gutters specified above or otherwise required by the NEC. Specifications are based on Advanced Protection Technologies #XDS. Other manufacturers (including Siemens #TPS, Square-D, or approved equal) meeting or exceeding the protection characteristics, ratings, redundancy, and general features of the specified equipment shall be considered.
- 20.2 Provide all new distribution panels with integral factory installed transient voltage surge suppression (TVSS). Where impossible to mount TVSS integral to panel without adding an additional vertical panel compartment, TVSS in a separate dedicated enclosure mounted directly adjacent to the panel shall be considered. Provide complete panel and TVSS UL 1449 Second Edition listed and providing TVSS protection in accordance with IEEE C62.41 and C62.45. Provide TVSS voltage and phase ratings to match panel and provide short circuit rating of 200,000 A.I.C. (minimum). Provide TVSS connecting directly to panel bus bars (on the load side of panel main circuit breaker, where applicable) and with breaker/fusing (and disconnecting means where required by code) as per the manufacturer. Provide panel enclosure including ample space for TVSS equipment and associated wiring, without reducing wiring space/gutters specified above or otherwise required by the NEC. Specifications are based on Advanced Protection Technologies #XDS. Other manufacturers (including Siemens #TPS, Square-D, or approved equal) meeting or exceeding the protection characteristics, ratings, redundancy, and general features of the specified equipment shall be considered.

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- 20.3 Provide a written warranty (including duration) on TVSS equipment in accordance with "Guarantee and Warranties" in specifications section 16100 "General Electrical", including warranty duration, except that the manufacturer's warranty period shall in no case be less than five (5) years.

END OF SECTION



## SECTION 16400 - LIGHTING SYSTEM

### 1. GENERAL PROVISIONS

- 1.1 The applicable requirements and conditions of specifications section "General Provisions" of specifications divisions 16100, General Electrical, and 16300, Electrical Materials, are hereby made an integral part of this section.
- 1.2 Provide lighting systems consisting of all components necessary for a complete installation. Refer to the lighting fixture/luminaire schedule on the drawings for additional information.
- 1.3 Luminaires including, but not limited to, those manufactured by the following shall be considered: Abolite, Cooper, Columbia, Contech, Elliptipar, Emergilite, General Electric, Hubbell, Insight, Kenall, Kim, Kirlin, Kurt Versen, Light Guard, Lightolier, Lithonia, LSI, Prescolite, Sim-Kar, Sterner, Stonco, Tivoli, Williams, Winona, and ZSLI (or approved equal).

### 2. DRIVERS, BALLASTS, AND WIRING

- 2.1 Completely coordinate exact lamp types (including configuration, dimensions, bases, pins, etc.), drivers, ballasts, starters, capacitors, sockets, luminaire construction and arrangement (as related to facilitating lamps and related equipment), and all applicable ancillary equipment and provide a complete and compatible installation.
- 2.2 Submit shop drawings of all drivers/ballasts proposed for use (multiple manufacturers and series are permitted, provided all drivers/ballasts conform to the specifications). Where luminaires are installed by the contractor which include drivers/ballasts that do not meet the specifications (without prior written approval) the contractor shall remove drivers/ballasts and provide new drivers/ballasts meeting the specified criteria at no cost to the owner.
- 2.3 Provide all drivers/ballasts of the high power factor solid-state electronic energy saving type, unless indicated otherwise on the drawings. Low power factor drivers/ballasts are not permitted unless specifically indicated on the drawings. Magnetic or any other type drivers/ballasts not identified/listed as energy saving type are not permitted under any circumstance. "Hybrid" or magnetic energy saving types are not permitted unless specifically indicated on the drawings.
- 2.4 Provide luminaires installed outdoors, in garages, or wherever "cold weather" drivers/ballasts are indicated on the drawings with -18 degrees C (0 degrees F) maximum rated cold weather solid state electronic energy saving drivers/ballasts, unless indicated otherwise. Provide cold weather ballasts for straight and "U-tube" fluorescent lamps meeting all other criteria specified for fluorescent ballasts serving these type lamps, except that cold weather ballasts may utilize instant starting of lamps; utilize Motorola #G1/2-RN-T8 series, Advance (Mark-V series), Magnetek (Triad series), or Valmont (Ultra-Miser series) (or approved equal).
- 2.5 Multiple-lamp luminaires may utilize quantity of drivers/ballasts at the contractor's discretion (i.e. one (1) multiple-lamp driver/ballast or several 1- or 2-lamp drivers/ballasts), unless indicated otherwise.
- 2.6 For lighting controlled by "dual switching", provide with two (2) separate drivers/ ballasts to facilitate switching. For "dual switched" three-lamp and four-lamp luminaires, provide

## SECTION 16400 - LIGHTING SYSTEM

internal wiring so the first switch controls inboard lamp(s) and the second switch controls outboard lamps. For "dual switched" two-lamp luminaires, provide internal wiring so the first switch controls the "left side" lamp and the second switch controls the "right side" lamp. For one-lamp luminaires, multiple lamp compact fluorescent and HID luminaires available only with a single driver/ballast, and other luminaires where unable to wire lamps separately which are controlled by "dual switching", connect to one (1) of the two (2) switches as directed by the engineer during construction (coordinate with the engineer prior to rough-in). Where branch wiring serving lighting controlled by "dual switching" installed by the contractor does not comply with the above, the contractor shall modify or remove and reinstall wiring to provide proper switching at no cost to the owner. Where luminaires controlled by "dual switching" are installed by the contractor and do not have drivers/ballasts and/or internal wiring to comply with the above, the contractor shall modify or replace drivers, ballasts, internal wiring, and/or the luminaires to provide proper switching at no cost to the owner.

- 2.7 For lighting shown with 0-10 V dimming, provide with drivers/ballasts to facilitate dimming. For all light emitting diode (LED) and fluorescent luminaires shown or specified with 0-10 V dimmable drivers/ballasts (wherever 0-10 V dimming is indicated on the drawings [including luminaire schedule] or specifications), provide both power wiring and 0-10 V control wiring to all luminaires. Run control wiring from all lights with 0-10 V dimmable drivers/ballasts to the respective dimmer or switch controlling the lighting. Where dimmers are shown on the drawings (including combination sensors/dimmers), interconnect control wiring with dimmers as per manufacturer. Where dimmers are not shown on the drawings, install control wiring to the switch (non-dimmed) location and safely insulate and cap off control wiring (to facilitate future replacement of non-dimmed switch with dimmer).
- 2.8 Provide high intensity discharge (HID) lighting where indicated on the drawings with high power factor multiple tap type ballasts, unless indicated otherwise on the drawings.
- 2.9 Provide all solid-state electronic energy savings ballasts for straight and "U-tube" fluorescent lamps as follows. Utilize Osram Sylvania (Motorola) "Quicktronic PROStart", General Electric (Ultra Start series), Philips Advance (Mark 5 series), or Universal (Magnetek/Triad series), and series ballasts (or approved equal). Provide only ballasts meeting or exceeding the criteria specified below (Note: Not all ballasts of the manufacturers' and series' listed above meet the following criteria, only ballasts meeting the criteria are acceptable).
- A. Minimum power factor: 0.90
  - B. Maximum total harmonic distortion (THD): 15%
  - C. Minimum ballast factor: 0.85
  - D. Maximum lamp crest factor: 1.5
  - E. Rating: UL-P, "A" sound rated
  - F. Provide arranged for rapid starting (or programmed rapid starting) of lamps, instant starting is not acceptable.
  - G. Maximum input watts shall not exceed the following:

One (1) 31/32 W T-8 lamp:	32 W
Two (2) 31/32 W T-8 lamps:	61 W
Three (3) 31/32 W T-8 lamps:	88 W
Four (4) 31/32 W T-8 lamps:	112 W

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One (1) 25 W T-8 lamp:	26 W
Two (2) 25 W T-8 lamps:	46 W
Three (3) 25 W T-8 lamps:	70 W
Four (4) 25 W T-8 lamps:	86 W
One (1) 17 W T-8 lamp:	19 W
Two (2) 17 W T-8 lamps:	34 W
Three (3) 17 W T-8 lamps:	52 W
Four (4) 17 W T-8 lamps:	62 W

### 3. LAMPS (LIGHT ENGINES)

- 3.1 Provide all lamps (the term "lamp" includes all light engines of any type which directly emit illumination) as follows. Completely coordinate exact lamp types (including configuration, dimensions, bases, pins, etc.), ballasts, drivers, starters, capacitors, sockets, luminaire construction and arrangement (as related to facilitating lamps and related equipment), and all applicable ancillary equipment and provide a complete and compatible installation.
- 3.2 Provide lamps for luminaires as indicated on the drawings. Provide all luminaires with lamps (even if lamp types and/or quantities are not shown on drawings) to provide a complete installation.
- 3.3 Acceptable lamp manufacturers include Osram/Sylvania, General Electric, and Philips (or approved equal). For high intensity discharge (HID) lamps only, lamps as manufactured by Venture are acceptable in addition to the manufacturers listed above. For tungsten halogen T-lamps, utilize only lamps as manufactured by Osram/Sylvania or Ushiu (or approved equal).
- 3.4 Maintain compatibility and consistency of lamp types and manufacturers (as well as lamp colors, except where different lamp colors are indicated on the drawings) throughout the project as much as possible. Provide luminaires so lamps are completely interchangeable between different luminaire types shown on the luminaire schedule with the same type lamps, wherever possible. For each combination of lamp type and color utilized on the project, provide all lamps of a single manufacturer. Different manufacturers are permitted for different lamp type and color combinations (except that for this provision, all straight and "U-tube" fluorescent lamps are considered as a common type and all compact fluorescent lamps are considered as a common type; i.e. provide all 32 W, 25 W, 17 W, and U31 W T-8 lamps of the same manufacturer). Utilizing more than one (1) manufacturer for any lamp type and color combination is not permitted (except where specifically approved in writing by the engineer and owner).
- 3.5 Provide all lamps (of all types) of the energy saving type, unless specifically indicated otherwise on the drawings. Lamps which are not energy saving are not permitted (unless specifically approved in writing by the owner, architect, and engineer. Provide all lamps of a type suitable for use ("burning") in any position (unless specific burning positions are indicated on the drawings).
- 3.6 Provide fluorescent lamps where indicated on the drawings. Provide lamp color temperature of 3,500 degrees K, unless indicated otherwise on the drawings. Provide straight and "U-tube" lamps of the T-8 type (unless indicated otherwise).

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- 3.7 Provide screw-in lamps where indicated on the drawings and as specified below. Provide of the medium base type, unless indicated otherwise. Utilize light emitting diode (LED) lamps unless incandescent is specifically indicated on the drawings.
- A. Provide all A-lamps of the energy saving type. For incandescent, utilize only General Electric "Watt-Miser" and "Watt-Miser Plus" series (or approved equal).
  - B. Provide all PAR-lamps of the energy saving type. Provide standard flood beam spread ("FL") unless indicated as "NFL" (narrow flood), "SP" (spot), or "NSP" (narrow spot), or as otherwise indicated in the luminaire schedule. For incandescent, utilize only energy saving tungsten halogen capsule type.
  - C. Provide all incandescent R-lamps of the energy saving type. Provide standard flood beam spread ("FL") unless indicated as "NFL" (narrow flood), "SP" (spot), or "NSP" (narrow spot), or as otherwise indicated in the luminaire schedule. For incandescent, utilize only General Electric "Watt-Miser" and "Watt-Miser Plus" series (or approved equal).
  - D. Provide all MR-lamps of the energy saving type. Provide standard flood beam spread ("FL") unless indicated as "NFL" (narrow flood), "SP" (spot), or "NSP" (narrow spot), or as otherwise indicated in the luminaire schedule. For LED, provide of a type with no ultraviolet (UV) emissions. For incandescent, utilize only tungsten halogen capsule type (where luminaires include protective shield/lens, utilize the type with integral "ultraviolet stop" capsule with average lamp life not less than 4,000 hours; where luminaires do not include protective shield/lens, utilize the covered type with average lamp life not less than 3,500 hours).
  - E. Provide all T-3 lamps of the double-ended RSC-base type (utilize either T-2.5 or T-3). Provide all T-4 lamps of the double contact bayonet (DC bay) base type (utilize either T-3.5 or T-4). Screw-in miniature candelabra (mini-can) base is not acceptable (unless luminaire is not available with RSC or DC-bay base). Utilize only T-lamps of a type suitable for use ("burning") in any position. For incandescent, utilize only quartz halogen with average lamp life not less than 2,000 hours.

### 4. LUMINAIRES

- 4.1 Provide luminaire types and manufacturers as indicated on the drawings. Where a luminaire type designation (i.e. letter) is not shown at a luminaire symbol, include costs in bid to provide any applicable type of luminaire used for the same symbol anywhere else on the drawings.
- 4.2 Support all luminaires (including outlet boxes and/or conduits used to support luminaires, where permitted) in complete accordance with all applicable requirements of the NEC (including, but not limited to, code requirements for mounting and support of luminaires, outlet and other boxes, conduits, raceways, and devices). Provide all required mounting hardware, including pendant kits, fasteners, hangers, wall mounted brackets, concrete foundations, conduits, supplementary supports, grounding, etc., for a complete installation. Support all

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luminaires completely independent of suspended ceilings and direct from the structure (suspended ceilings are permitted to provide supplemental lateral support to luminaires which are vertically supported direct from the structure), except as follows. Luminaires are permitted to be supported from/by suspended ceilings only where both the general contractor's suspended ceiling installation and the electrical contractor's method of securing luminaires to the suspended ceiling are in complete accordance with NEC requirements for supporting luminaires. Supporting luminaires with or from conduits or raceways is not permitted, except that luminaires specifically designed for conduit support may be supported utilizing only rigid steel conduit (supporting with any other type conduit or raceway, including IMC, EMT, PVC, surface raceway, and flexible conduit, is not permitted under any circumstance). Supporting luminaires from screw shells of lamp holders is not permitted under any circumstance. Supporting luminaires or wiring from trees or vegetation is not permitted under any circumstance.

- 4.3 Refer to architectural drawings, reflected ceiling plans, and details for exact locations of all luminaires. Verify final location of all luminaires with the owner, architect, and lighting designer (where applicable) prior to rough-in.
- 4.4 Perform field measurements, verify proper clearances, and verify all exact mounting and installation conditions and requirements prior to ordering luminaires.
- 4.5 Provide integral thermal protection for all recessed luminaire housings.
- 4.6 Perform aiming of all adjustable interior luminaires. Include all costs to aim to the satisfaction of the owner, architect, and engineer. This aiming may be performed during normal working hours.
- 4.7 For surface mounted luminaires wired utilizing surface mounted wiring methods, provide wiring entering the side of luminaires. Where fixtures do not facilitate side entry of wiring, provide fixture with manufacturer's back mounting adapter (so wiring enters side of adapter and then enters rear of fixture by passing through adapter). Installing the fixture on surface outlet boxes (in such a way that there is a significant "gap" between the fixture and the wall/ceiling surface) is not acceptable.
- 4.8 Wherever finish colors are indicated on the drawings (including symbol list and luminaire schedule) as being selected by the architect ("as per architect", etc.), include costs in bid to utilize any of the available standard and/or optional colors listed in manufacturers' catalogs (excluding any colors identified in manufacturers' catalogs as "custom" or "premium").
- 4.9 Where luminaires are specified or furnished by the contractor with tamper resistant hardware (including, but not limited to, torx, spanner, allen/torx with center reject pin, etc.) which must be removed in order to access lamps or drivers/ballasts for replacing or servicing, furnish and turn over to the owner not less than two (2) tamper resistant screw drivers of each type required.
- 4.10 Where track lighting, continuous linear lighting, and similar luminaires are indicated on the drawings, provide complete and coordinated installation. Install in continuous lengths with even appearance as shown on the drawings utilizing general sections as shown on the drawings (or if not shown as otherwise required and available from the manufacturer).

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Include all joining/extension fittings (corners, tees, crosses, straight extensions, etc., with lens and/or louver where applicable), end caps, aligning/attaching hardware, ceiling flanges, grid rails, yokes, etc. (where applicable). For luminaires installed continuous between building members (walls, ceiling soffits, or other architectural structures and details), individually measure exact dimensions at each and every locations and order and install luminaires accordingly. Fully coordinate the installation with the architect and general contractor.

### 5. EXTERIOR LIGHTING

- 5.1 All provisions of the section of this specification "General Lighting" apply to exterior lighting as modified herein.
- 5.2 Provide all pole mounted and "bollard" type ground mounted luminaires with suitable concrete foundations complete with embedded (during pour) "J-hook" anchor bolts. Anchors installed or set after foundations are cast are not acceptable under any circumstance. Notify the owner, architect, and engineer after excavation and prior to pouring concrete to facilitate inspection. Provide conduit mounted ground luminaires with conduit secured in minimum 300 mm x 300 mm x 300 mm (12" x 12" x 12") concrete poured below grade and embedding conduit 90 degree bends at luminaire locations. Provide embedded conduit bends, conduit exposed above grade, and conduit between embedded bends and the portion exposed above grade as rigid steel only.
- 5.3 Install luminaire poles and bollard luminaires on foundations utilizing leveling nuts (nuts above and below base); shims are not acceptable. Grout between the foundation and pole/bollard base utilizing suitable non-shrink mortar finished vertically to the outside of the base, with a drain hole. Where grouting is not required or recommended by the pole/bollard manufacturer, grouting may be omitted where pole base cover or bollard housing completely covers the space between foundation and base.
- 5.4 For all concrete pole and bollard foundations, submit shop drawings (based on foundations shown on the drawings) of exact foundation construction, fabrication, and characteristics. Base pricing on foundation dimensions below grade as shown on foundations detail(s) on the drawings. Dimensions below grade may be reduced from the width/diameter and depth dimensions shown on the detail(s) where approved by the lighting manufacturer and in accordance with structural foundation shop drawings. Prepare and submit structural foundation shop drawings (sealed by a registered professional engineer from the state where the project is located) showing that the foundation is sufficient to fully support the forces involved based on actual soil conditions present at each respective foundation location (whether or not dimensions are reduced). Provide soil boring test results at each foundation location. The electrical contractor is fully responsible for all costs associates with engaging the services of structural registered professional engineer and performing soil borings for this purpose.
- 5.5 For all luminaire poles and bollards, provide approved tags for wiring (inside hand holes, where applicable). Provide tags indicating the panel name and circuit number (or other source of feeder), and stating the voltage, phase, and amperes of the feeder. Provide feeder tags wording and layout similar to engraved plastic nameplates (see specifications section "Identification, Nameplates, and Tags" of specifications division 16300, Electrical Materials).

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- 5.6 Perform night aiming of all adjustable exterior luminaires. Include all costs in bid (including overtime costs for work at night) to aim to the satisfaction of the owner, architect, and engineer.

### 6. EMERGENCY AND EXIT LIGHTING

- 6.1 Provide all emergency and exit lighting as indicated on the drawings.
- 6.2 Verify exact mounting, quantity of faces, and directional arrows of all exit signs prior to ordering.
- 6.3 Install all exit signs at general locations as shown on the drawings. Coordinate and obtain approval for exact locations with the architect and local authorities having jurisdiction before installation. Install exit signs to ensure they are completely and clearly visible from the entire covered areas and egress paths.
- 6.4 Perform aiming of all adjustable emergency luminaires. Include all costs to aim to the satisfaction of the owner, architect, engineer, and local authorities having jurisdiction. This aiming may be performed during normal working hours.
- 6.5 Wherever any battery units or battery packs are installed (including batteries integral to luminaires), connect power to the battery units/packs on the line side of all lighting and other control switches so it is impossible to de-energize by turning any switch off.
- 6.6 Where indicated on the drawings (see also the luminaire schedule), provide emergency luminaires with integral and/or field-installed driver/ballast generator transfer device (BGTD). Provide as Philips/Bodine #GTD (or approved equal). Provide incoming emergency source wiring from emergency panel to light as shown on drawings (3 #10, 3/4" C, unless otherwise noted). Provide incoming normal source wiring (with constantly energized un-switched "constant hot" conductor, switch controlled "switched hot" conductor, neutral conductor, and grounding conductor) run from the normal switch location to the first normal-only light controlled by the switch then to the driver/ballast generator transfer device at emergency luminaires (4 #12, 3/4" C, unless otherwise noted). Provide internal luminaire wiring run from generator transfer device to controlled driver/ballast within each emergency luminaire.

END OF SECTION





## SECTION 16500 - FIRE ALARM

### 1. GENERAL PROVISIONS

- 1.1 The applicable requirements and conditions of specifications section "General Provisions" of specifications divisions 16100, General Electrical, and 16300, Electrical Materials, are hereby made an integral part of this section.
- 1.2 Extent of fire alarm and detection system work is indicated on the drawings and schedules. Types of fire alarm and detection equipment includes the following:
  - A. Control panel
  - B. Remote annunciator
  - C. Audio/visual horn/strobes and visual strobes
  - D. Manual pull stations
  - E. Smoke, heat, and other automatic fire detectors
  - F. Duct type smoke detectors
  - G. Fire suppression (i.e. sprinklers, etc.) system flow, tamper, pressure, and other supervisory switch connections
  - H. Magnetic door holders
- 1.3 Provide the fire alarm system (including operation, equipment, devices, wiring, installation, and manufacturer's representative services [programming, testing, adjustment, equipment start-up, as-built documentation, and operation and maintenance documentation and instructions]) in complete accordance with all applicable federal, state, and local codes and standards (including National Electrical Code (NEC), Institute of Electrical and Electronic Engineers (IEEE), National Fire Protection Association (NFPA), Underwriter's Laboratories (UL), Factory Mutual (FM), American National Standards Institute (ANSI), National Electrical Contractors' Association (NECA) "Standard of Installation", Americans with Disabilities Act (ADA), United States Department of Labor Occupational Safety and Health Administration (OSHA), all local municipal authorities having jurisdiction (local authorities), etc.). Provide fire alarm system controls and all new and existing system components (including devices, equipment, modules, interfaces, etc.) listed to operate together. Provide all signaling devices of an ADA approved type providing ADA approved audible and visual coverage throughout all areas of the project.
- 1.4 These specifications are based on a fire alarm system of the addressable analog type.
- 1.5 Equipment as manufactured by GE Infrastructure (Edwards/EST), Honeywell (Fire Control Instruments (FCI) and Notifier product lines only), Siemens, and Simplex/Grinnell/Tyco (or approved equal) shall be considered.
- 1.6 Only fire alarm equipment which can be programmed by any approved service vendor and which utilizes non-proprietary coding/programming shall be considered. Only fire alarm manufacturers authorizing at least three (3) independent service vendors in the project area shall be considered. Submit a list of local approved service vendors with shop drawings. Perform manufacturer's representative services (specifically including programming, testing, adjustment, equipment start-up, as-built documentation, and operation and maintenance documentation and instructions) throughout the entire duration of the project, up through final testing and acceptance of the system by the owner and local authorities having jurisdiction, include all costs in bid. *No extra consideration, claims, charges, or compensation will be granted under any circumstance for manufacturer's representative services (including programming, testing, adjustment, equipment start-up, as-built*

## SECTION 16500 - FIRE ALARM

*documentation, and operation and maintenance documentation and instructions) during the project (specifically including where associated with changes to the scope of work, alternates, unit prices, allowances, etc.) performed before final testing and acceptance of the system. Extra claims and/or compensation shall only be considered for changes which are initiated after final testing and acceptance of the system.*

- 1.7 Where existing fire alarm devices connect to or interface with the new fire alarm system, only fire alarm equipment (i.e. the control panel where devices directly connect to the control panel or interface modules which connect between the control panel and devices) which is listed as compatible with the existing devices shall be considered. The electrical contractor is fully responsible for verifying all requirements and all exact existing devices in the field before submitting shop drawings and shall provide the system accordingly. Include all costs in bid.

### 2. SUBMITTALS

- 2.1 Submit shop drawings including, but not limited to, shop drawings on equipment and devices (specifically showing manufacturers, model numbers, and listing information), rough in diagrams, detailed project-specific riser and wiring diagrams (specifically showing conductor/cable types and sizes), installation layout drawings (specifically showing locations of all equipment and devices on floor plans [drawn to scale], equipment, and wiring and information on ceiling height and construction [on architectural background plans which shall be made available to the contractor for this purpose], information showing ADA compliant signaling device audible and visual coverage (specifically show all audible device decibel (dB) and visual device candela (cd) settings), and specifically showing interfaces with all fire suppression systems [sprinklers, etc.]), installation instructions, written warranty, detailed zone or addressable device lists (showing each system point identifiable from the control panel and the associated numbered address and detailed description), sequence of operation, power supply wiring information, and power consumption/supply/battery sizing and voltage drop calculations. Submit quantity as indicated elsewhere in the specifications to the engineer for review and approval. In addition to submitting to the engineer, submit additional sets (quantity as per local authorities) to the local authorities having jurisdiction for review, approval, and permits.
- 2.2 Include all costs in bid associated with preparing and submitting shop drawing information. This includes sealing (by a registered professional engineer) all submittal information which is submitted to local authorities having jurisdiction for review.
- 2.3 Upon project completion, submit operation and maintenance (O&M) manuals (include with other project O&M manuals). Submit at least three (3) original copies of all fire alarm system software.
- 2.4 Upon project completion, submit certification of the entire system to the owner and local authorities having jurisdiction.

### 3. FIRE ALARM AND DETECTION SYSTEMS

- 3.1 Provide Class "B" alarm and detection system products of types, sizes and capacities indicated, which comply with manufacturer's standard design, materials, and components.

## SECTION 16500 - FIRE ALARM

- 3.2 The fire alarm riser diagram on the drawings is approximate as a general guide to system architecture and functioning. Quantities of devices shown on the riser are approximate. Provide exact quantities as specified (based on floor plan drawings, etc.).
- 3.3 Additional/Spare Devices: Include providing (furnish, install, and wire including manufacturer's representative services [programming, testing, adjustment, equipment start-up, as-built documentation, and operation and maintenance documentation and instructions]) additional devices (in addition to devices shown on drawings or otherwise required by specifications) as follows. Include at least of 10% (of the respective quantity of each type device specified or otherwise used on the project) of each respective type notification, initiation, supervisory, and control device from specifications section 16500-4 (excluding control panel and annunciator), but in no case less than a minimum of two (2) of each type device); where additional and/or spare device quantities greater than zero (0) are specifically shown on the drawings those quantities take precedence over the percentage above. Include 15.2 m (50'0") of the appropriate type of fire alarm wiring for each additional device. If additional devices are not completely used by the conclusion of the project (after final acceptance by the owner), turn any remaining additional fire alarm devices over to the owner as spares. Additional devices may be used at any time during the project, include all costs in bid.
- 3.4 Provide a complete fire alarm system with the following sequence of operation and functions.
- A. Fire Alarm Activation: Actuation of any initiating device (including manual pull stations, automatic smoke, heat, and other fire detectors [including duct detectors, except as specifically provided below], and fire suppression flow/activation switches, etc.) initiates a "fire alarm" and activates all fire alarm signaling, output, and notification devices (including, but not limited to, horns and strobes, elevator interfaces, HVAC equipment shut-downs, door releases, and central station and fire department alarm notification).
  - B. Trouble Alarm Activation: Any trouble conditions in the fire alarm system (including actuation of fire suppression system tamper/status supervisory switches) initiates a "trouble alarm" and activates central station (and fire department where required) trouble notification and an audio and visual signal at the control panel and remote annunciator (where applicable). "Trouble alarms" do not activate alarm signaling devices or output devices (do not activate elevator interfaces or door releases [or HVAC equipment shut-downs, except as specifically provided as follows]). Only where code officials specifically require in writing that duct smoke detectors NOT initiating a general "fire alarm", duct detectors shall initiate a "duct smoke supervisory alarm" audio and visual signal at the control panel and remote annunciator and activate appropriate central station (and fire department where required) trouble notification.
  - C. Elevator Interfaces: Provide detectors, devices, wiring, conduit, relaying, final connections, and associated equipment between fire alarm controls, elevator controls, and shunt trip devices for the functions below. Perform all connections at elevator controls under the supervision of the elevator supplier. Functions below summarize operation only. Provide exact operation in strict accordance with all applicable codes and standards (including fire and elevator codes) and as directed by local authorities

## SECTION 16500 - FIRE ALARM

having jurisdiction. Functions shown are typical of each elevator. Provide individual and distinct signals from the fire alarm system to elevator controls for each of the following functions:

- 1) Recall, Designated Floor: Recall elevator to the "designated" level upon one (1) of the following two (2) options, as directed by local authorities having jurisdiction (contact local authorities and verify which option is required during construction, include all costs in bid):
  - a) Option #1: Upon any "fire alarm"
  - b) Option #2: Upon activation of elevator lobby (except the designated level, see below). See also shaft/machine room recall below.
- 2) Recall, Alternate Floor: Recall elevator to the "alternate" level upon activation of designated level elevator lobby smoke detector(s).
- 3) Recall, Shaft/Machine Room: Recall elevator to the designated level upon activation of elevator pit or elevator machine room smoke detector(s) (except as follows). Where the alternate level is above the designated level, recall to the alternate level upon activation of pit detector(s). Where the elevator machine room is located on the designated level, recall to the alternate level upon activation of machine room detector(s). This signal shall be made via a supervised relay having multiple output contacts to facilitate initiating the required elevator functions and to facilitate activating elevator indicating lights (lights and all wiring by the elevator supplier) indicating fire in the elevator shaft and/or machine room.
- 4) Shut-Down: Operate shunt trip device(s) to disconnect incoming power to elevator(s) upon either of the following.
  - a) Heat Detectors: *Provide the following heat detectors (whether or not shown on the drawings), unless the use of sprinkler flow switches is specifically shown on electrical/fire protection drawings.* Provide location and quantity of heat detectors as follows (locations/quantity are not shown on drawings). Locate so there is a heat detector within 610 mm (2'0") of every sprinkler head. Utilize only heat detectors having minimum listed spacing rating of 7.6 m (25'0") and lower temperature rating and higher sensitivity (i.e. lower response time index (RTI)) than elevator shaft/room sprinkler heads. Fully coordinate all requirements with the sprinkler contractor and provide detectors accordingly (include costs in bid for special heat detectors). Heat detectors may be of the addressable type or may be of the conventional type connected to the fire alarm system through a common addressable interface module (minimum one (1) module for each individual shaft/room opening).
  - b) Sprinkler Flow Switches: *Where specifically shown on electrical/fire protection drawings, the following may be utilized in lieu of heat detectors.* Where sprinkler piping is dedicated to serving elevator shafts/machine rooms and where this dedicated sprinkler piping is provided with code-approved flow/pressure sensing switch(es), utilize switch(es) to activate shut-down function.

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- 5) Any means to bypass or override recall/shut-down functions are part of elevator controls (not the fire alarm system, N.I.C.).
- D. HVAC Equipment Shut-Down: Upon any "fire alarm" (or duct smoke detector activation where duct detectors do not activate fire alarm), shut down HVAC equipment (including all air handling equipment operating at 0.94 m<sup>3</sup>/s (2,000 cfm) or greater and any other equipment specifically indicated on the drawings or mechanical/ATC specifications) and open/close motorized dampers in accordance with all applicable codes and standards. Provide wiring, conduit, relaying, and final connections from the fire alarm system to ATC controls. Perform all connections at the ATC controls under the supervision of the mechanical/ATC contractor. For equipment operating at 7.08 m<sup>3</sup>/s (15,000 cfm) or greater provide at least two (2) detectors per unit (supply and return).
- E. Door Release: Upon any "fire alarm", release all magnetic door holders.
- F. Central Station and Fire Department Notification: Provide the fire alarm system to facilitate notifying the local fire department in accordance with codes and local authorities having jurisdiction, through the services of an appropriate and central station. Coordinate all requirements (relating to fire alarm system equipment and wiring) with the owner, the owner's central station vendor (where applicable), and local authorities having jurisdiction. As a minimum, provide an individual and distinct signal from the fire alarm system for each of the following functions in addition to any other functions required by code:
- 1) Fire Alarm: Upon any "fire alarm" condition initiated any fire alarm device (excluding fire suppression flow/activation and duct smoke detection).
  - 2) Sprinkler Alarm: Upon any "fire alarm" condition initiated by any fire suppression flow/activation switch.
  - 3) Duct Detector Supervisory: Upon activation of any duct smoke detector.
  - 4) Trouble Alarm: Upon any "trouble alarm" condition.
- G. Smoke Control: Where smoke control systems (i.e. atrium and/or stairwell smoke control) are *specifically shown on the drawings (only)*, provide the fire alarm system arranged to send a signal to the HVAC/ATC controls (at a control interface point(s) located at the controlled mechanical equipment) to activate the smoke control system as follows. Send one (1) signal, with two (2) states (state #1 is the normal condition, with the smoke control system inactive and state #2 is with the smoke control system operating). Provide an approved hand-off-auto switch mounted directly adjacent to the fire alarm control panel with an engraved laminated plastic nameplate reading "ATRIUM SMOKE CONTROL SYSTEM" (properly describe the system) and functioning as follows.
- 1) When in the "hand" position, activate the smoke control system (state #2) regardless of the status of the fire alarm system and regardless of the status of other ATC controls. Sound a trouble alarm in the fire alarm system whenever the switch is in the "hand" position.

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- 2) When in the "off" position, the smoke control system shall not operate (state #1), regardless of the status of the fire alarm system and regardless of the status of other ATC controls. Sound a trouble alarm in the fire alarm system whenever the switch is in the "off" position.
- 3) When in the "auto" position, the fire alarm system shall automatically operate (state #2) the smoke control system upon activation of any automatic fire detector or sprinkler flow switch in or serving the smoke control system area, regardless of the status of other ATC controls. Coordinate exact devices involved with the mechanical engineer during construction. Resetting the fire alarm system shall automatically reset the smoke control system to the normal (state #1) condition. Activation of any manual pull station (anywhere in the building) or activation of automatic fire alarm devices not in or associated with the atrium shall not activate the smoke control system.
- 4) When in the "auto" position and when the fire alarm system is not in an alarm condition as noted above, equipment may be controlled by HVAC/ATC controls. However, any activation of the fire alarm system or of the hand/off/auto switch must override HVAC/ATC controls.
- 5) The HVAC/ATC system (not by the E.C.) shall operate and respond to signals from the fire alarm system as indicated in the mechanical specifications and as directed by the mechanical engineer.
- 6) The electrical contractor shall provide all wiring associated with the smoke control system from the fire alarm control panel to and from the hand-off-auto switch and from the fire alarm control panel to supervised fire alarm control relays located at each piece of controlled HVAC equipment. All wiring from relays to HVAC unit control circuits shall be by the mechanical/ATC contractor.

H. Pre-Action Sprinkler Releasing Service: Where specifically shown on the drawings (only), provide the fire alarm system arranged to *directly* enable and activate all of the pre-action sprinkler fire suppression systems present in the building. Include all equipment and wiring (by the electrical contractor) to the pre-action controllers (controllers furnished and installed by the sprinkler contractor) for operation and according to code. Refer to fire suppression specifications for additional information and fully coordinate all work and all requirements with the sprinkler contractor and fire suppression engineer. These provisions do not apply where sub-panels (installed by the fire suppression contractor) are used to control pre-action sprinklers. These provisions only apply where building fire alarm system detectors are used to initiate pre-action release and where NO automatic fire alarm initiating devices (smoke or heat detectors) directly connect to any pre-action controller (i.e. where the only initiating devices are part of this fire alarm system (by the E.C.) and these devices activate the pre-action controls).

### 4. MATERIALS, EQUIPMENT, AND DEVICES

- 4.1 CONTROL PANEL: Provide fire alarm control panel surface mounted where indicated on the drawings and including the following items and/or features:

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- A. Addressable analog type
- B. UL Listed
- C. Modular design, solid-state construction
- D. Visual alarm and trouble indicators
- E. Automatic ground detection
- F. Double supervision
- G. Alarm verification
- H. Dead front construction
- I. Supervised signal circuit modules (complete and including modules to synchronize visual indicating devices), Class B type
- J. Output devices (elevator interfaces, HVAC equipment shut-downs, door releases, etc.) relaying, field programmable
- K. Complete power supply including incoming power overvoltage surge (lightning) protection
- L. Battery backup (to operate the system under "normal", "trouble", and "alarm" conditions as per code, but not less than a minimum of 24 hours and then operate the system in "alarm" condition for a minimum of 15 minutes at the end of the 24 hour period), including charger and batteries, fully supervised and automatic
- M. Auxiliary contacts, minimum of 10, field programmable
- N. Equipment, devices, modules, and wiring for central station and fire department notification and tie-in; including telephone dialer, telephone line interface, transmitter, telephone line wiring, etc.. Provide a telephone/data outlet (see symbol list on drawings) at control panel for tie-in.
- O. Device termination module
- P. Detector loop module, Analog type
- Q. Integral keyboard display and interface module
- R. Provide power to (obtain from power circuit for main control panel) and smoke detector(s) located to provide protection/coverage (in accordance with NFPA-72 requirements) for the main fire alarm control panel, all sub- or slave- control panels, all power supplies, all remote indicating controllers, and related equipment, whether shown on the drawings or not.

Where remote indicating control appliance relays and/or modules are required for control of ADA signaling devices, mount integral to the control panel enclosure or in a single separate enclosure directly adjacent to the control panel. Batteries may be mounted in the control panel enclosure or in a separate single enclosure.

- 4.2 REMOTE ANNUNCIATOR: Provide annunciator of the alphanumeric type (minimum 80 character), flush mounted, and including the following options:
- A. Lamp test key switch
  - B. Drill switch key switch
  - C. Audible/visual trouble alarm with silencing switch

Provide annunciator displaying the activated device(s) address(es) and "zone indication" as shown on the fire alarm riser diagram for any alarm or trouble condition. Submit shop drawings of annunciator layout for review and approval prior to ordering.

- 4.3 COMBINATION HORN AND STROBE ASSEMBLIES: Provide combination horn and flashing strobe audible and visual notification appliances with code approved wording

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"FIRE". Provide listed, flush mounted (mount on flush outlet box), ADA approved type wired using Class "B" supervised circuits. Provide listed for wall or ceiling mounting as applicable. Only appliance types featuring both listed wall mounting models and listed ceiling mounting models or models listed for both wall and ceiling mounting shall be considered. For all dwelling units and for sleeping areas in other occupancies, utilize only NFPA compliant low-frequency (nominal 520 Hz) devices. Provide audibly and visually synchronized (utilizing synchronized type appliances in conjunction with suitable synchronizing control modules in signaling circuits) to prevent photosensitive reactions and ensure distinct audible patterns. Provide with adjustable output settings (90, 95, and 99 dBA audible and 15, 30, 75, and 95 or 110 cd visual). Base pricing and wiring and power supply sizing on maximum settings. Lower output settings shall be considered only where they provide audible and visual coverage meeting or exceeding ADA and code requirements (throughout all areas of the project where coverage is required or otherwise shown on the drawings) and where the manufacturer submits calculations/criteria showing compliant coverage. Include costs in bid to provide additional signaling appliances where necessary to provide compliant coverage.

- 4.4 STROBE ONLY ASSEMBLIES: Provide flashing strobe visual notification appliances with code approved wording "FIRE". Provide listed, flush mounted (mount on flush outlet box), ADA approved type wired using Class "B" supervised circuits. Provide visually synchronized (utilizing synchronized type appliances in conjunction with suitable synchronizing control modules in signaling circuits) to prevent photosensitive reactions. Provide with adjustable output settings (15, 30, 75, and 95 or 110 cd). Base pricing and wiring and power supply sizing on maximum settings. Lower output settings shall be considered only where they provide audible and visual coverage meeting or exceeding ADA and code requirements (throughout all areas of the project where coverage is required or otherwise shown on the drawings) and where the manufacturer submits calculations/criteria showing compliant coverage. Include costs in bid to provide additional signaling appliances where necessary to provide compliant coverage.
- 4.5 MANUAL PULL STATIONS: Provide station semi-flush mounted (mount on flush outlet box), of the non-coded double-action type with key reset switch. Provide each pull station individually addressed and interfaced to addressable fire alarm system utilizing a suitable addressable monitor module (integral to station or a separate module mounted in the station outlet box).
- 4.6 SMOKE DETECTORS: Provide detector of the dual chamber, solid state photoelectric, addressable, and analog type arranged for two-wire, non-polarized installation. Provide detector of low profile design, white in color, and with twist-lock base for mounting on standard flush outlet box.
- 4.7 HEAT DETECTORS: Provide detector functioning on both fixed temperature (rating as indicated on the drawing, unless otherwise required as noted below) and rate-of-rise principals of operation. Provide addressable and analog type arranged for two-wire, non-polarized installation, of low profile design, white color finish, and with twist-lock base for mounting on standard flush outlet box. For areas where ambient temperatures may normally exceed 38 degrees C (100 degrees F), such as unconditioned attic spaces or spaces which are not insulated, utilize detectors with temperature ratings as recommended by the detector manufacturer for the application (detectors rated 80 degrees C (175 degrees F) or greater may utilize fixed temperature sensing only [rate-of-rise sensing is not required for these detectors]). Verify all requirements associated with temperature ratings with



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manufacturer in detail before purchasing detectors or rough-in (no extra consideration, claims, charges, or compensation will be granted under any circumstance associated with temperature ratings of heat detectors).

- 4.8 DUCT TYPE SMOKE DETECTORS: Provide suitable duct housing with detector (as indicated above), sampling tubes (coordinate with ductwork), addressable relay for HVAC shutdown interface, and remote mounted test/reset/indicating station. Arrange addressable relay to shutdown HVAC equipment upon addressable signal from the fire alarm control panel. Provide addressable HVAC shutdown relay either integral to (and part of) duct housing or separately mounted directly adjacent to the duct housing. Detector or housing auxiliary contacts or relay operating only when the individual duct smoke detector is in alarm condition are not acceptable. Where either the HVAC equipment and/or any associated ductwork are new or modified, mechanical contractor shall install detector on ductwork and provide all HVAC shutdown interface wiring from relay to HVAC equipment. Where both the HVAC equipment and all associated ductwork are existing to remain, electrical contractor shall install detector on ductwork (as directed by and under the supervision of the mechanical contractor and mechanical engineer) and provide all HVAC shutdown interface wiring from relay to HVAC equipment (making final connections at HVAC equipment as directed by and under the supervision of the mechanical contractor and mechanical engineer). Electrical contractor shall furnish detector and associated equipment, provide all wiring and connections to fire alarm system, and install the remote test/reset/indicating station in all circumstances.
- 4.9 FIRE SUPPRESSION SUPERVISORY AND OTHER ACTUATION DEVICES: Interconnect and monitor every fire suppression system (including systems utilizing sprinklers [including fire pump where applicable], carbon dioxide, foam, chemical, halogen, deluge, pre-action, standpipes, etc. where applicable) supervisory device (including flow, pressure, tamper, etc. switches) to the fire alarm system. Interconnect and monitor every fire actuation device part of or installed along with architectural or mechanical equipment and apparatus (including smoke and/or fire dampers [including those in ducts, at shafts, and for ceiling radiation], smoke and/or fire doors, gates, grills, and shutters, fan control, and other similar equipment/apparatus) to the fire alarm system. Provide suitable addressable monitor modules and all wiring for complete connections between each monitored device and the fire alarm system. Supervisory and actuation devices shall be furnished and installed on fire suppression systems, equipment, and apparatus by the respective installing contractor and wired to the fire alarm system by the electrical contractor. Connect supervisory and actuation devices whether shown on the electrical drawings or not. Review fire protection, mechanical, and architectural drawings and coordinate with fire protection, mechanical, and general contractors before submitting bid and include all costs in bid.
- 4.10 SUPERVISORY AND CONTROL DEVICES: Interconnect each supervisory and control device (other than fire suppression system devices) specifically indicated on the drawings to the fire alarm system. Provide suitable addressable monitor modules and all wiring for complete connections between each monitored device and the fire alarm system.
- 4.11 RELAY INTERFACES: Provide a suitable addressable output module for control relay interconnection to the addressable fire alarm system. Provide all wiring for complete connections to the respective controlled device. Provide output modules for all HVAC/elevator recall and shutdown connections, magnetic door holders, etc.

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- 4.12 Wherever non-addressable ("conventional") style devices remain, are specified, or are otherwise required for the project (i.e. to satisfy code requirements or where addressable devices are not approved by NFPA, UL, or FM for the application) in conjunction with the addressable system, provide each device individually addressed utilizing a suitable addressable monitor module. Verify all requirements before submitting bid and include all costs in bid.
5. LOCKS AND KEYS
- 5.1 Refer also to the section of this specification "Locks and Keys" of specifications section 16300 "Electrical Materials".
- 5.2 Provide all fire alarm equipment cabinets and enclosures with locking covers/doors. Provide enclosures and key operated devices (including pull stations and duct detector test/reset stations) keyed alike.
6. INSTALLATION
- 6.1 Provide fire alarm wiring in complete accordance with all requirements of other sections of the electrical specifications, except as modified below. Utilize wiring methods in accordance with specifications section 16200 "Electrical Work Practices".
- 6.2 Provide all fire alarm system wiring as directed, recommended, and approved by the system manufacturer and meeting all system manufacturer minimum requirements (including where manufacturer's requirements exceed the requirements of the specifications and the NEC). #14 AWG conductors are the minimum permitted. Provide all wiring utilizing solid conductors. Stranded conductors are permitted only where in accordance with NEC Article 760. The fire alarm system may utilize individual conductors wiring in conduit and/or multi-conductor cables (in conduit where otherwise required by the specifications).
- 6.3 Provide multi-conductor cables (where utilized) as follows. Provide insulation rated not less than 300 V. Utilize only cables having an overall red jacket and approved by the NEC and NFPA for use with fire alarm systems. Plenum rated cables may be utilized, but only in dry locations (plenum cables, even when installed in conduit, are prohibited in damp and wet locations). In damp locations, utilize only cables specifically listed and identified for use in damp or wet locations. Provide all cables in wet locations (including underground and embedded in concrete slabs at or below grade) specifically designed for outdoor and submerged use and specifically listed and identified for use in wet locations.
- 6.4 Provide raceways for the fire alarm system dedicated to fire alarm wiring. Fire alarm raceways may not contain wiring of any other system (including power, lighting, controls, telecommunications, etc.). Where fire alarm wiring is recommended or required by the manufacturer to be separated from other fire alarm wiring due to noise, interference, or other concerns, install wiring in separate raceways (or physically separate wiring as per manufacturer recommendations where wiring is permitted elsewhere to run without raceway). Paint outlet, junction, device, and other boxes, conduit bodies, and covers associated with the fire alarm system red. Paint exposed fire alarm raceways red.
- 6.5 Identify fire alarm equipment, devices (as listed below), and wiring as indicated in specifications section "Identification, Nameplates, and Tags" of specifications division 16300, Electrical Materials.

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- A. Provide an engraved laminated plastic nameplate on the front cover of the fire alarm control panel reading, "FIRE ALARM CONTROL PANEL - 120V, 20A - PP1, CCT. 4"). Indicate the panel and circuit number feeding the control panel. Provide similar nameplates at all power supply units, auxiliary power supplies, and signaling circuit power extender modules.
  - B. Provide red engraved laminated plastic nameplates with 6.5 mm (1/4") high (minimum) white letters at each pull station reading "IN CASE OF FIRE: SOUND ALARM AND CALL 911" (or "IN CASE OF FIRE: SOUND ALARM AND CALL THE FIRE DEPARTMENT" where the building telephone system does not facilitate directly dialing 911), "FIRE ALARM DOES NOT CALL FIRE DEPARTMENT", or with other wording as directed by the local authorities having jurisdiction.
  - C. Provide two (2) engraved laminated plastic nameplates for each duct type smoke detector, one (1) on the detector housing and one (1) on the remote test/reset/indicating station. List the name and description of the equipment served (i.e. "#AHU-1 - AIR HANDLING UNIT", etc.). Utilize 3.2 mm (1/8") high minimum lettering.
  - D. Suitably label (in an engineer and owner approved method) all addressable fire alarm devices (manual pull stations, smoke detectors, heat detectors, duct type smoke detector housings, duct smoke detector test/reset/indicating stations, supervised output relay modules, identification modules, etc.) with the respective system address. Labeling annunciator(s) is not required. Labeling signaling devices and magnetic door holders is not required, except that labeling is required for any associated addressable relays.
- 6.6 For all existing fire alarm devices (initiating or signaling, of any kind), components, and functions required to remain active and/or operational (by code, by the owner, or by local authorities having jurisdiction) which are not shown as new or replaced by the new fire alarm system, interface and connect (utilizing wiring and new system modules, etc.) existing devices, components, and functions to the new fire alarm system to maintain operation. Provide whether shown on the drawings or not.
- 6.7 Where replacing existing fire alarm devices with new devices, existing locations may be used where practical, provided NFPA required coverage is maintained and provided it does not represent a change in scope of work. Where replacing devices in existing drop ceilings which remain, reuse existing ceiling tiles and install new devices in existing holes in tiles (reuse existing holes). Relocate tiles within ceiling for proper device locations. Removing existing devices in such a manner which leaves exposed openings (holes) in tiles is not acceptable. Patching holes in tiles and using blank cover plates to close holes in tiles are not acceptable. Where required to avoid leaving holes, patching, and blank covers, provide (at the electrical contractor's expense) new ceiling tiles to match existing (submit shop drawings [and samples, if requested] of ceiling tiles to the architect and owner for review and approval).

## 7. QUALITY ASSURANCE

- 7.1 Completely test the entire system as per "Testing" in specifications section 16100 "General Electrical". Perform the following additional testing.

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- 7.2 Completely test the entire system to demonstrate proper operation, functioning, capability, and compliance with all code and specification requirements. Inspect equipment, devices, relays, signals, etc. for malfunctioning. Correct malfunctions and retest to demonstrate satisfying the above requirements. Perform all testing in complete accordance with all applicable NFPA-72 standards and testing procedures.
- 7.3 The electrical contractor and manufacturer's representative shall fully certify (in writing) the entire system and system operation, including documenting successful testing of the system. Submit copies of certification to the owner and local authorities having jurisdiction.
- 7.4 Provide manufacturer's representative services performed by specially trained personnel employed by the fire alarm system manufacturer's representative. Perform manufacturer's representative services (specifically including programming, testing, adjustment, equipment start-up, as-built documentation, and operation and maintenance documentation and instructions) throughout the entire duration of the project, up through final testing and acceptance of the system by the owner and local authorities having jurisdiction, include all costs in bid. *No extra consideration, claims, charges, or compensation will be granted under any circumstance for manufacturer's representative services (including programming, testing, adjustment, equipment start-up, as-built documentation, and operation and maintenance documentation and instructions) during the project (specifically including where associated with changes to the scope of work, alternates, unit prices, allowances, etc.) performed before final testing and acceptance of the system.* Extra claims and/or compensation shall only be considered for changes which are initiated after final testing and acceptance of the system.
- 7.5 Provide a demonstration period of one (1) full working day to instruct owner's personnel in the operation and maintenance of the system.

### 8. WARRANTY AND SERVICE CONTRACT

- 8.1 Provide a written warranty on all equipment in accordance with "Guarantee and Warranties" in specifications section 16100 "General Electrical".
- 8.2 Make a service contract available to the Owner after the warranty expires. The owner may accept or decline service contract at the owner's discretion.

END OF SECTION

## SECTION 16550 - SYSTEMS PATHWAYS

### 1. GENERAL PROVISIONS

- 1.1 The applicable requirements and conditions of specifications section "General Provisions" of specifications divisions 16100, General Electrical, and 16300, Electrical Materials, are hereby made an integral part of this section.
- 1.2 This specifications section applies to all pathways and related work for communications systems wiring (including only telecommunications, data, sound, security, and CCTV, where applicable), whether the wiring of each respective system is installed by the electrical contractor, the owner, the owner's vendor(s), or other contractors. The term "wiring installer" applies to the party installing wiring of the respective system. The installer of each system shall be as indicated elsewhere in these specifications and/or the drawings.
- 1.3 This specifications section does not apply in any way to wiring as part of power, lighting, emergency, over 600 V, control, fire alarm, and any other systems.

### 2. RACEWAYS AND SLEEVES

- 2.1 Provide all raceways and sleeves (including all fittings, conduit bodies, boxes, supports, etc.) for communications systems wiring in complete accordance with other sections of this specification except as modified below and unless specifically indicated otherwise.
- 2.2 Provide minimum sizes for conduits and sleeves as follows, unless indicated otherwise. Provide pull strings in all raceways.
  - A. 103 mm (4") for main service, trunk line, and primary pathway conduits/sleeves.
  - B. 21 mm (3/4") for branch secondary pathway conduits.
  - C. 27 mm (1") for branch secondary sleeves, unless indicated otherwise.
- 2.3 Install conduits so bends in conduit runs do not exceed a maximum total of 180 degrees between manholes, pull boxes, junction boxes, conduit bodies, etc..
- 2.4 Flexible conduit is not permitted for communications systems wiring, unless specifically approved in writing under the following circumstances only. Where flexible conduit is utilized, minimum sizes permitted are 129 mm (5") for main service, trunk line, and primary pathways and 27 mm (1") for branch secondary pathways.
  - A. Where existing walls are fished.
  - B. Where physically impossible to install rigid/fixed (non-flexible) conduit.

### 3. SEALING AND FIRE-STOPPING

- 3.1 Seal and fire-stop all raceways and sleeves in complete accordance with other sections of this specification and as per code except as modified below and unless specifically indicated otherwise.
- 3.2 Seal once wiring is installed. Where wiring is not installed at this time, seal all empty conduits.

## SECTION 16550 - SYSTEMS PATHWAYS

- 3.3 Seal all underground conduits and conduits entering the building with suitable rubber conduit plugs as soon as conduits are installed and prior to installation of wiring in conduits. Once wiring is installed, reseal conduits with suitable rubber conduit plugs, water plugs, or duct sealer. Provide all seals water and gas tight.
4. GROUNDING
    - 4.1 Provide all grounding as per other sections of this specification and as per code except as modified below and unless specifically indicated otherwise.
    - 4.2 Provide a ground bus at all communications rooms and backboards. Provide one (1) ground bus assembly for every linear 2.4 m (8'0") of backboard at each respective location. Provide IlSCO #NB-350-42 ground bus assembly with #R16 mounting block (Burdny, Ideal, Thomas and Betts/Blackburn, or approved equal). Bond each ground bus to the building electrical service grounding electrode system with #6 AWG minimum conductors. The ground bus facilitates connecting systems cable surge protectors, where used.
    - 4.3 Provide a #4/0 bare copper ground wire the length of all telephone and data risers, bond to the building grounding electrode system.
    - 4.4 Maintain complete mutual separation between the communications systems grounding system, and the electrical power grounding system, except at a single point of connections to the electrical power grounding electrode system as close a possible to the grounding electrode and/or electrical service.
    - 4.5 Bond all raceways, conduits, cable trays, messengers, etc. to the communications systems ground busses or ground wires.
  5. RECEPTACLES/LIGHTING/EQUIPMENT IN COMMUNICATIONS ROOMS
    - 5.1 Locate all equipment to avoid conflicts with risers and cabling. Confirm all exact receptacles, luminaires, smoke detectors, and other equipment locations in writing with the owner prior to rough in.
  6. OUTLET BOXES
    - 6.1 Provide minimum depth of outlet boxes as 70 mm (2.75") to facilitate terminating category-5 and similar cables. Smaller boxes are permitted only with written approval and only where construction will not allow use of 70 mm (2.75") deep boxes.
  7. WIRING ACCESS PATHWAYS
    - 7.1 Provide complete pathways for communications systems wiring. This includes all raceways, sleeves, cable trays, and other wiring access. Provide pathways as specified below. Provide pathways extending between communications rooms, closets, and backboards and from these locations to each and every communications systems outlet. Refer to the drawings for additional information.

SECTION 16550 - SYSTEMS PATHWAYS

- 7.2 Prior to rough in, coordinate all proposed cable routing with the owner and wiring installer.
- 7.3 Service Pathways: Provide incoming service wiring access pathways as indicated on the drawings, refer to the riser diagram.
- 7.4 Trunk Pathways: Provide trunk line wiring access pathways between communications closets, rooms, and backboards as indicated on the drawings, refer to the riser diagram.
- 7.5 Primary Pathways: Provide primary wiring access pathways out from communications closets, rooms, and backboards to serve branch outlets as follows:
  - A. Provide steel strand supporting messengers along all proposed routes of primary wiring access pathways. This includes all corridors used for telephone, data, and security wiring access. Suitably secure messengers at intervals not exceeding 2.4 m (8'0") utilizing "J" clips or other approved hardware. Messenger installation and routing is not shown on the drawings, provide installation and routing as applicable. Securely support all messenger ends and bends utilizing suitable strain relief clamps. Size messengers as per NEC requirements. Messengers are not required where cable trays and conduits are installed (see below).
  - B. Provide conduits and cable trays for primary wiring access pathways shown on the drawings.
- 7.6 Secondary Pathways: Provide secondary wiring access pathways from each individual branch outlet to the nearest primary pathway as follows:
  - A. Provide conduits from each respective outlet, from communications compartments of surface raceways, and from communications raceways of modular furniture stubbed and capped into corridor drop ceiling spaces (or other primary pathway locations) or into communications closets, as indicated on the drawings, refer to the symbol list.
  - B. Conduits are permitted to stub into accessible ceiling spaces in other rooms, away from primary pathway locations. Where conduits do not stub directly into corridors or other primary pathway locations, provide sleeves through all walls and obstructions leading from the conduit stub location to the primary pathway location. Provide sleeve sizes based on the quantity of outlets to be wired as follows. Provide multiple sleeves to facilitate the total quantity of outlets.

<u>Sleeve Size</u>	<u>Maximum Quantity of Outlets</u>
27 mm (1")	2
35 mm (1.25")	3
41 mm (1.5")	5
53 mm (2")	9
63 mm (2.5")	13
78 mm (3")	19
91 mm (3.5")	26
103 mm (4")	34

- C. The wiring installer shall provide support for secondary pathway cable runs, except that where quantity of outlets served exceeds twelve (12), the electrical contractor shall provide supports as indicated above for primary pathways.

## SECTION 16550 - SYSTEMS PATHWAYS

### 8. WIRING

- 8.1 The wiring installer (the electrical contractor, the owner, the owner's vendor(s), or other contractors as applicable to each respective system) shall provide only wiring complying with the all of the following.
- 8.2 Provide wiring for each respective system as directed, recommended, and approved by the respective system manufacturer and meeting all minimum requirements of the system manufacturer (including where manufacturer's requirements exceed the requirements of the specifications and the NEC).
- 8.3 Provide all cables as multi-conductor style having an overall jacket (of a color other than red; red is reserved for fire alarm) and utilize only cables approved by the NEC for use with the respective system.
- 8.4 Provide all wiring in plenum spaces in complete accordance with the NEC. In dry location plenum ceilings, utilize only plenum rated cables. For damp and wet location plenum ceilings and in all other duct and plenum spaces, run wiring (utilize a non-plenum type suitable for the damp/wet location) in metal conduit. Plenum rated cables may be utilized for other (i.e. non-plenum) applications, but only in dry locations. Plenum cables, even when installed in conduit, are prohibited in damp and wet locations.
- 8.5 In damp locations, utilize only cables specifically listed and identified for use in damp or wet locations. Provide all cables in wet locations (including underground and embedded in concrete slabs at or below grade, whether in conduit or direct buried) specifically designed for outdoor and submerged use and specifically listed and identified for use in wet locations.

END OF SECTION