

SPECIFICATIONS FOR THE
Pittsgrove Township Board of Education
1076 Almond Road
Pittsgrove, New Jersey 08318

Arthur P. Schalick High School
2025 New Field House
718 Centerton Road
Pittsgrove, NJ 08318

Architect:

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

Construction Manager:

GREYHAWK
2000 Midlantic Drive Suite 210
Mount Laurel, NJ 08054
(856) 722-1800

Site Engineer:

Fralinger Engineering PA
629 Shiloh Pike
Bridgeton, NJ 08302
(856) 451-2990

**Mechanical, Plumbing &
Electrical Engineer:**

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

ISSUED FOR BID: April 21, 2025
GA# 24-74

INDEX TO THE SPECIFICATIONS

<u>TITLE</u>	<u># of Pages</u>
Bidder's Checklist	3 Pages
Notice to Bidders	2 Pages
Instructions to Bidders	14 Pages
Bid Form	4 Pages
Acknowledgment of Receipt of Addenda/ Clarification	1 Page
Statement of Ownership	4 Pages
Bid Bond	2 Pages
Consent of Surety	1 Page
Total Amount of Uncompleted Contracts	1 Page
No Material Adverse Change in Qualification	1 Page
C.271 Political Contribution Disclosure Form	4 Pages
Hold Harmless Agreement	1 Page
Certification Regarding the Debarment, Suspension, Ineligibility & Voluntary Exclusion	2 Pages
Federal Non-Debarment Certification	5 Pages
Affirmative Action Requirements	1 Page
Exhibit B - Mandatory Affirmative Action	3 Pages
Non-Collusion Affidavit	1 Page
Equipment Certification	1 Page
Disclosure of Investment Activities in Iran	3 Pages
Certification of Non-Involvement in Prohibited Activities in Russia or Belarus	1 Page
Americans with Disabilities Act of 1990	1 Page
Performance and Payment Bond	2 Pages
Maintenance Bond	2 Pages
Initial Project Manning Report	2 Pages

A101	Standard Form of Agreement Between Owner and Contractor	13 Pages
A201	General Conditions of the Contract for Construction AIA Document A201-2017	60 Pages

1

GENERAL REQUIREMENTS

01010	Summary of Work District Calendar – 2024 – 2025 School Year District Calendar – 2025 - 2026 School Year	01010-1 to 01010-6 1 Page 1 Page
01040	Coordination	01040-1 to 01040-2
01045	Cutting and Patching	01045-1 to 01045-3
01095	Reference Standards and Definitions	01095-1 to 01095-8
01200	Project Meetings	01200-1 to 01200-2
01210	Allowances	01210-1 to 01210-2
01300	Submittals Shop Drawing Cover Page Request for Substitutions Monthly Safety and Health Report	01300-1 to 01300-7 1 Page 2 Pages 1 Page
01310	Construction Progress Documentation	01310-1 to 01310-4
01400	Quality Requirements DCA Bulletin 03-5	01400-1 to 1400-7 4 Pages
01500	Construction Facilities and Temporary Controls	01500-1 to 01500-8
01524	Construction Waste Management	01524-1 to 01524-6
01600	Materials and Equipment	01600-1 to 01600-3
01700	Contract Closeout	01700-1 to 01700-6
01740	Warranties and Bonds	01740-1 to 01740-2

2

SITE WORK

	Geotechnical Evaluation Report	35 Pages
02110	Site Clearing	02110-1 to 02110-4
02200	Earthwork	02200-1 to 02200-9
02511	Hot Mix Asphalt Paving	02511-1 to 02511-9
02700	Sewerage and Drainage	02700-1 to 02700-17

2		<u>SITE WORK – continued</u>	
	02741	Site Water Utility Distribution Piping	02741-1 to 02741-10
	02821	Chain Link Fences and Gates	02821-1 to 02821-5
	02920	Turf and Grasses	02920-1 to 02920-9
3		<u>CONCRETE</u>	
	03300	Cast-in-Place Concrete	03300-1 to 03300-20
4		<u>MASONRY</u>	
	04720	Cast Stone Masonry	04720-1 to 04720-6
	04810	Unit Masonry Assemblies	04810-1 to 04810-28
6		<u>WOOD AND PLASTICS</u>	
	06100	Rough Carpentry	06100-1 to 06100-10
	06651	Solid Surface Windowsills and Countertops	06651-1 to 06651-4
7		<u>THERMAL AND MOISTURE PROTECTION</u>	
	07200	Water Repellents	07200-1 to 07200-2
	07210	Building Insulation	07210-1 to 07210-3
	07272	Fluid-Applied Membrane Air Barriers	07272-1 to 07272-15
	07920	Joint Sealants	07920-1 to 07920-7
8		<u>DOORS AND WINDOWS</u>	
	08100	FRP Fiberglass Doors	08100-1 to 08100-6
	08105	Steel Frames	08105-1 to 08105-3
	08211	Flush Wood Doors	08211-1 to 08211-3
	08412	Aluminum Framed Entrances and Storefronts	08412-1 to 08412-11
	08520	Aluminum Projection Windows	08520-1 to 08520-11
	08710	Door Hardware	08710-1 to 08710-25
	08800	Glazing	08800-1 to 08800-9
9		<u>FINISHES</u>	
	09255	Gypsum Board Assemblies	09255-1 to 09255-8

9		<u>FINISHES - continued</u>	
	09510	Acoustical Ceilings	09510-1 to 09510-4
	09653	Resilient Wall Base and Accessories	09653-1 to 09653-2
	09670	Fluid Applied Flooring	09670-1 to 09670-5
	09900	Painting	09900-1 to 09900-8
10		<u>SPECIALTIES</u>	
	10156	Toilet Compartments	10156-1 to 10156-3
	10426	Signs: Interior Room Signs	10426-1 to 10426-3
	10522	Fire Extinguishers, Cabinets and Accessories	10522-1 to 10522-2
	10800	Toilet and Bath Accessories	10800-1 to 10800-3
12		<u>FURNISHINGS</u>	
	12242	Roller Window Shades	12242-1 to 12242-5
13		<u>SPECIAL CONSTRUCTION</u>	
	13340	Engineered Post Frame Structures	13340-1 to 13340-13
15		<u>MECHANICAL</u>	
	15010	General Requirements	15010-1 to 15010-20
	15110	Basic Materials and Methods	15110-1 to 15110-9
	15180	Insulation	15180-1 to 15180-4
	15190	Testing and Balancing	15190-1 to 15190-8
	15656	Ductless Split System	15656-1 to 15656-4
	15810	Air Handling Equipment	15810-1 to 15810-3
	15860	Duct Systems	15860-1 to 15860-9
	15870	Tempered Air Terminal Units	15870-1 to 15870-2
	15930	Facility Management Control System	15930-1 to 15930-19
15		<u>PLUMBING</u>	
	15015	General Requirements	15015-1 to 15015-11
	15115	Basic Materials and Methods	15115-1 to 15115-9

15	<u>PLUMBING - continued</u>		
	15185	Insulation	15185-1 to 15185-2
	15260	Well Water System	15260-1
	15410	Water Supply Systems (Interior)	15410-1 to 15410-2
	15420	Soil and Waste System	15420-1
	15450	Plumbing Fixtures and Equipment	15450-1 to 15450-3
16	<u>ELECTRICAL</u>		
	16100	General Electrical	16100-1 to 16100-14
	16200	Electrical Work Practices	16200-1 to 16200-18
	16300	Electrical Materials	16300-1 to 16300-20
	16400	Lighting System	16400-1 to 16400-3
	16500	Fire Alarm System	16500-1 to 16500-8

BIDDER'S CHECKLIST

BIDDERS SHALL SUBMIT THE FOLLOWING FORMS WITH THE BID

- ☐ 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 square for that item. Please note that the first two lists are the requirements for the Bidder.

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

- ☐ Bid Form (All blank spaces are required to be filled out)
- ☐ 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

BIDDER'S CHECKLIST

**THE FOLLOWING FORMS ARE REQUESTED TO BE SUBMITTED WITH THE BID
AND MUST BE SUBMITTED PRIOR TO THE AWARD OF THE CONTRACT**

**FAILURE TO SUBMIT THE FOLLOWING FORMS PRIOR TO AWARD
SHALL BE CAUSE FOR AUTOMATIC REFUSAL TO AWARD AND
REJECTION OF THE BID**

- ☐ Notice of Classification issued by the State of New Jersey Department of the Treasury Division of Property Management and Construction
- ☐ C.271 Political Contribution Disclosure Form
- ☐ Hold Harmless Agreement
- ☐ Certification Regarding the Debarment, Suspension, Ineligibility and Voluntary Exclusion
- ☐ Certification of Non-Debarment for Federal Government Contracts
- ☐ Affirmative Action Requirements
- ☐ Non-Collusion Affidavit
- ☐ Equipment Certification in accordance with item 6c in the Instructions to Bidders
- ☐ Disclosure of Investment Activities in Iran
- ☐ Certification of Non-Involvement in Prohibited Activities in Russia or Belarus
- ☐ Public Works Contractor Registration Certificate
- ☐ Business Registration Certificate or Proof of Business Registration

BIDDER'S CHECKLIST

**BIDDER SHALL SUBMIT THE FOLLOWING FORMS WITH THE BID
IN RELATION TO SUBCONTRACTORS NAMED IN THE BID**

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

- ☐ A Total Amount of Uncompleted Contracts Affidavit (form DPMC 701)
-

**THE FOLLOWING FORMS ARE REQUESTED TO BE SUBMITTED WITH THE BID IN
RELATION TO EACH OF SUBCONTRACTORS NAMED IN THE BID
AND MUST BE SUBMITTED PRIOR TO THE AWARD OF THE CONTRACT**

**FAILURE TO SUBMIT THE FOLLOWING FORMS PRIOR TO AWARD
SHALL BE CAUSE FOR AUTOMATIC REFUSAL TO AWARD AND
REJECTION OF THE BID**

- ☐ DPMC Notice of Classification
- ☐ Trade License (if applicable)
- ☐ Business Registration Certificate
- ☐ Public Works Contractor Registration Certificate

NOTICE TO BIDDERS

Sealed bids will be received by the Pittsgrove Township Board of Education at the Administration Building located at 1076 Almond Road, Pittsgrove, New Jersey 08318 until 3:00 P.M. local time on **Tuesday, May 13, 2025** and will be publicly opened and read immediately thereafter, at said place for **Arthur P. Schalick High School 2025 New Field House**.

It is expressly understood that the Bidder is responsible for getting the bid to the Business Administrator by 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; they shall be mailed or delivered to the address stated herein, enclosed in an opaque sealed envelope, clearly marked with the name of the Bidder and the name of the Project as described in this Notice to Bidders; and must be received by not later than the time designated in this 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 3:00 PM will be returned unopened.

The Bidders shall submit, in accordance with N.J.S.A. 18A:18A-18(b)(2), one Lump Sum Bid for all the work and materials. Bidders must be pre-qualified by the New Jersey Department of Treasury, Division of Property Management and Construction (DPMC) with at least the DPMC classification associated with the work they intend to directly perform or, if Bidder will not directly perform any work, with DPMC classification C006, C008, or C009. Bidders' Prime Subcontractors, defined as those listed in N.J.S.A. 18A:18A-18, must be pre-qualified by DPMC with the DPMC classification associated with the work they intend to directly perform or subcontract. The Bidder and named Prime Subcontractors 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 jminniti@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, **Pittsgrove Township 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 law, including, but not limited to, those regarding (a) Prequalification of Bidders (N.J.S.A. 18A:18A-26 et seq.); (b) Prevailing Wage Rates (N.J.S.A. 34:11-56.25 et seq.); (c) Use of Domestic Materials, (N.J.S.A. 18A:18A-20); and (d) Ownership Disclosure Certification, (N.J.S.A. 52:25-24.2).

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 Public Works Contractor Registration Certificates for Bidder and its named Prime Subcontractors be included in the Bidder's Bid Package, but the 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, including Bidders and Named Prime Subcontractors, are required to be registered with the State through the New Jersey Department of Treasury, Division of Revenue. The Owner is requesting that copies of the Registrations for Bidder and its Named Prime Subcontractors be included in the Bidder's Bid Package, but the Bidder must provide proof of such Registrations prior to the award of the Contract. In addition, each Bid Package must include a certificate from a surety company stating it will provide said Bidder with a bond in such sum as required by N.J.S.A. 18A:18A-25.

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, defects, and non-material exceptions. Bidders are required to comply with the provisions of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27-1.1 et seq.

The Time Schedule for the project is as follows:

Monday	04/21/25	Bid packages available via Electronic Delivery
Wednesday	04/23/25	Pre-Bid Meeting at 3:00 PM at the Pittsgrove Township Board of Education Administration Building located at 1076 Almond Road, Pittsgrove, New Jersey 08318. Attendance at the Pre-Bid meeting is not mandatory, but strongly recommended.
Tuesday	04/29/25	Deadline for Questions to Garrison Architects (email questions to jminniti@garrisonarch.com)
Thursday	05/01/25	Addendum Issued to the Plan Holders, if required
Tuesday	05/13/25	Bids Due at 3:00 P.M. in the Pittsgrove Township Board of Education Administration Building located at 1076 Almond Road, Pittsgrove, New Jersey 08318.

By Order of the Pittsgrove Township Board of Education
Darren Harris, 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 Pittsgrove Township Board of Education, 1076 Almond Road, Pittsgrove, New Jersey 08318.
- b. Architect: The term "Architect" refers to Garrison Architects, 713 Creek Road, Bellmawr, New Jersey 08031, (856) 396-6200, Fax (856) 396-6205.
- c. Construction Manager: The term "Construction Manager" refers to GREYHAWK, 2000 Midlantic Drive, Suite 210, Mount Laurel, New Jersey 08054, (856) 722-1800.
- d. 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.
- e. School Facilities Project: This is the construction project which is the subject of this specification.
- f. The Contract Documents include: all items listed in the Index to the Specifications, including forms submitted by the awardee; all Addenda / Clarifications; all Drawings made available prior to the submission of bids; all Specifications made available prior to the submission of bids; all Schedules made available prior to the submission of bids; and the A101 and A201 to be entered by the Owner and the awardee and all documents attached thereto and incorporated therein.
- g. Prime Subcontractor: The term "Prime Subcontractor" means a subcontractor performing work in any of the branches of work listed in N.J.S.A. 18A:18A-18(a) and all work kindred thereto.

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 all defined allowances 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 the full bid package 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 and number 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

- d. Bidders shall submit all documents listed on the Bidder's Checklist.
- e. The failure to include a document with a bid shall not be considered a defect where the Bidder's Checklist "requests", rather than requires, that the document be submitted with the bid. However, the failure to submit such document prior to award shall be cause for the Owner's refusal to award and for rejection of the bid.

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 the Deadline for Questions 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 in a manner consistent with N.J.S.A. 18A:18A-21(c) 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 and the Contract Documents and has made provisions for construction under the applicable conditions; Bidder is responsible for seeing that his Prime Subcontractors are similarly familiar with the site and requirements of the Contract Documents so far as applicable to their work.**
- b. Bids shall be based upon the Contract Documents and may not be withdrawn for a period of 60 days after the date set for receiving bids. Any bid which has been opened by the Owner may not be withdrawn during the period specified 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 furnishing the required Performance and Payment Bond as required by the Contract Documents.
- b. Bid securities of the three lowest responsible bidders will be retained until Contract Documents have been properly executed by the bidder to whom the contract is awarded but in no event exceeding 60 days after bid opening unless consent of the bidders and, if applicable, their sureties is obtained for such longer period as may be agreed. 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 and Payment Bond and a Maintenance 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, Payment Bond, and Maintenance 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 waive minor informalities or non-material exceptions in the bid or bidding process, 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. The submission of a bid vests no contractual, property, or other right in favor of the bidder.
- b. The Owner reserves the right to reject all bids pursuant to the Public Schools Contracts Laws. 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 and/or the New Jersey Economic Development Authority or successor State Agency, had prior negative experience(s) as defined and in accordance with N.J.S.A. 18A:18A-4.
- 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 in writing 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 the Owner and the awardee.
- f. The A101, A201, Performance and Payment Bond, and Maintenance 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 N.J.A.C. 5:30-11 and the availability of funds per N.J.A.C. 6A:23A-21.1.

INSTRUCTIONS TO BIDDERS

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.
- b. It shall be the duty of each prospective bidder to inform its prospective Subcontractors of such Addenda / Clarifications to the extent that they may be affected.
- c. Any Addenda / Clarifications issued by the Architect will be sent in a manner consistent with N.J.S.A. 18A:18A-21(c) to each prospective bidder of whom the Architect shall have a record.

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 N.J.S.A. 18A:18A-19, the Owner may deduct, from the contract price, 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 A201. A Performance and Payment Bond is required in the amount of 100% of the Contract price for each Bond. A Two (2) year Maintenance Bond is required in the amount of 100% of the Contract.

The Performance and Payment Bond need not be submitted with the bidder's bid but must be submitted at the time of execution of the Contract. The Performance and Payment Bond shall be in compliance with requirements of the New Jersey Publics Schools Contracts Law and Public Works Bond Act, specifically N.J.S.A. 18A:18A-25 and N.J.S.A. 2A:44-143 et seq. The Maintenance Bond shall be in the form provided herewith and shall be provided to Owner as required in the A201.

INSTRUCTIONS TO BIDDERS

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, as to (1) and (2), for each of its named 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. Bidders must be pre-qualified by the New Jersey Department of Treasury, Division of Property Management and Construction (DPMC) with at least the DPMC classification associated with the work they intend to directly perform or, if Bidder will not directly perform any work, with DPMC classification C006, C008, or (if the project does not call for construction of a new facility) C009. Bidders' Prime Subcontractors must be pre-qualified by DPMC with the DPMC classification associated with the work they intend to directly perform or subcontract. Notwithstanding anything else in this bid document package, Bidders need not name subcontractors furnishing general construction work under N.J.S.A. 18A:18A-18(a)(5). 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. These documents are requested to be provided with the bid, but in any event shall be submitted prior to the contract award. The classification status of bidders and named Prime Subcontractors will be independently verified through DPMC after the bid opening, prior to award.
- (2) TOTAL AMOUNT OF UNCOMPLETED CONTRACTS affidavits (Form DPMC 701) duly signed and notarized with the corporate seals affixed. These documents must be submitted with the bid.
- (3) Bidder 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.

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

Bidders are required to comply with the New Jersey Prevailing Wage Act, N.J.S.A. 34:11-56.25 et seq. (the "Wage Act"), 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 or otherwise violates the Wage Act, 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.

Pursuant to N.J.S.A. 34:11-56.27a, if the lowest responsive bidder submits a bid that is ten percent (10%) or more below than the next lowest bid, the lowest responsive bidder shall certify to the Owner that the prevailing wage rates required by the Wage Act shall be paid. If the bidder does not provide the certification prior to award of the contract, the bidder shall not be entitled to the award and its bid will be rejected.

INSTRUCTIONS TO BIDDERS

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 be included in the contract by the Board.

The Public Works Contractor Registration Act, N.J.S.A. 34:11-56.48 et seq. (the "Registration Act") requires that Contractors and named Prime Subcontractors must be registered pursuant to the Registration Act prior to submitting a bid. The Owner requests bidder provide a copy of the Public Works Contractor Registration Certificate for itself and any named Prime Subcontractors at the time of submission of the bid, but bidder must provide the Public Works Contractor Registration Certificate for itself and any named Prime Subcontractors prior to award. The Contractor shall enter into subcontracts only with subcontractors, whether Prime Subcontractors or otherwise, who are registered pursuant to the Act.

13. CERTIFIED PAYROLL REQUIREMENTS

Governor Murphy signed into law S-1442/A-5345, now P.L. 2023, c. 138, which requires public works contractor registration and payroll certification for public works projects to be completed online at <https://njwages.nj.gov/>. The Contractor will be required to submit the certified payroll via the Hub and via hard copy to Pittsgrove Township Board of Education for itself and its subcontractors.

14. BUSINESS REGISTRATION AND USE TAX

Pursuant to N.J.S.A. 52:32-44, the Owner is prohibited from entering into a contract with a bidder unless the bidder and each named Prime Subcontractor has a valid Business Registration Certificate on file with the Division of Revenue and Enterprise Services within the Department of the Treasury. The Owner is requesting that copies of the Registrations for bidders and their named Prime Subcontractors be included with the bid, but the bidder must provide proof of such Registrations prior to the award.

Additionally:

- (1) The contractor shall not enter a contract with a subcontractor, whether a Prime Subcontractor or otherwise, for this project unless the subcontractor first provides the contractor with a valid proof of business registration.
- (2) After award, and prior to commencing work on site, the Contractor shall maintain and submit to the Owner a list of subcontractors and their addresses, which must be updated as provided information is no longer current.
- (3) The contractor and any subcontractor providing goods or performing services for this project, 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 final list of all subcontractors used and their addresses.

INSTRUCTIONS TO BIDDERS

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.

15. OWNERSHIP DISCLOSURE CERTIFICATION

Pursuant to 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 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.

If one or more such stockholder or partner or member is itself a corporation or partnership or limited liability company, the stockholders holding ten percent (10%) or more of that corporation's stock, or the individual partners owning ten percent (10%) or greater interest in that partnership, or the members owning ten percent (10%) or greater interest in that limited liability company, as the case may be, shall also be listed. The disclosure shall be continued until the names and addresses of every non-corporate stockholder, and individual partner, and member, exceeding the ten percent (10%) 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 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, 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 and the relevant page numbers of the filings that contain the information on each person that holds a 10 percent or greater beneficial interest.

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

INSTRUCTIONS TO BIDDERS

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

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:

- a. In the hiring of persons for the performance of work under this contract or any subcontract hereunder, or for the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under this contract, no contractor, nor any person acting on behalf of such contractor or subcontractor, shall, by reason of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex, discriminate against any person who is qualified and available to perform the work to which the employment relates;
- b. No contractor, subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee engaged in the performance of work under this contract or any subcontract hereunder, or engaged in the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under such contract, on account of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex;
- c. There may be deducted from the amount payable to the contractor by the contracting public agency, under this contract, a penalty of \$ 50.00 for each person for each calendar day during which such person is discriminated against or intimidated in violation of the provisions of the contract; and
- d. This contract may be canceled or terminated by the contracting public agency, and all money due or to become due hereunder may be forfeited, for any violation of this section of the contract occurring after notice to the contractor from the contracting public agency of any prior violation of this section of the contract.

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 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.

INSTRUCTIONS TO BIDDERS

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 RESPONSIBLE BIDDER(S)

If at the time this Contract is to be awarded, the lowest responsive 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. However, if said bid exceeds such amount, or other lawful cause exists, the Owner may reject all bids.

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.

In accordance with N.J.A.C. 6A:23A-6.3 the Board may not award a contract over \$17,500 to a bidder that has made a reportable contribution to a member of the district board of education during the preceding one-year period. Bidders must submit a C.271 Political Disclosure Form in the form provided with the Specifications at least ten (10) days prior to award.

23. NON-COLLUSION AFFIDAVIT

The Owner is requesting that the Non-Collusion Affidavit be included with the bid, but the bidder must provide the Non-Collusion Affidavit prior to the award.

24. 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.

INSTRUCTIONS TO BIDDERS

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 Board 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 board 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 Board 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 board, 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.

25. CERTIFICATION OF PROHIBITED ACTIVITIES IN RUSSIA AND/OR BELARUS

Pursuant to N.J.S.A. 52:32-60.1, et seq. (L. 2022, c. 3) a State agency or local unit, as applicable, shall require a person seeking to enter into or renew a contract to certify, before the contract is awarded, renewed, amended, or extended, that the person is not identified on a list created by the Department of the Treasury as a person engaging in prohibited activities in Russia or Belarus. The certification required shall be executed on behalf of the applicable person by an authorized officer or representative of the person. If a person is unable to make the certification required because the person or one of the person's parents, subsidiaries, or affiliates has engaged in prohibited activity in Russia or Belarus, the person shall provide to the State agency or local unit of government concerned, prior to the deadline for delivery of such certification, a detailed and precise description of such activities, such description to be provided under penalty of perjury. The certifications provided and disclosures provided shall be disclosed to the public. Engaged in prohibited activities in Russia or Belarus means (1) companies in which the Government of Russia or Belarus has any direct equity share; (2) having any business operations commencing after March 9, 2022 that involve contracts with or the provision of goods or services to the Government of Russia or Belarus; (3) being headquartered in Russia or having its principal place of business in Russia or Belarus, or (4) supporting, assisting or facilitating the Government of Russia or Belarus in their campaigns to invade the sovereign country of Ukraine, either through in-kind support or for profit.

The Certification of Prohibited Activities in Russia and/or Belarus Form is to be completed, certified and submitted prior to the award of contract.

INSTRUCTIONS TO BIDDERS

26. 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 the 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.

The OWNER shall, as soon as practicable after a claim has been made against it, give written notice thereof to the CONTRACTOR along with particulars of the claim then known by the OWNER. 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, or an independent violation by the OWNER, 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.

27. NEW JERSEY OFFICE OF CLEAN ENERGY REBATE

During the performance of the contract, if and when requested by the Owner or the Owner's Representative, Contractor shall 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.

INSTRUCTIONS TO BIDDERS

28. **STUDENT AND FACULTY SAFETY:**

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 personnel or agents of the Contractor shall observe all rules and regulations in effect at the Owner’s premises. For purposes of this section, Contractor’s personnel includes the personnel of subcontractors of any tier. Contractors shall assume full responsibility for the actions of all their personnel. 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. 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 his classification. The Contractor shall provide evidence of qualifications for any personnel performing work under contract upon request.

Employees, personnel, 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, personnel, or agents of the Owner. 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. 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.

Owner (and/or the Owner’s Representatives) reserves the right to direct the removal from the site of any person, equipment and/or entity Owner and/or Owner’s Representative reasonably deems unfit or who/which displays inappropriate behavior, including but not limited to, alcohol consumption, drugs, fighting, intimidating or disruptive behavior, the use of language reasonably considered inappropriate on school grounds, harassing or biased or prejudiced behavior, negligent or reckless behavior, vandalism, theft, improper storage, or illegal acts. Such behaviors or actions by Contractor’s personnel shall be deemed a violation of the terms of the contract by Contractor.

All personnel of the Contractor will be required to wear picture identification badges in a visible manner while working on the Owner’s premises; the badges must identify the individual and the firm with which the individual is employed. Contractors’ personnel are to wear uniforms whenever possible. At the beginning of each workday, Contractor shall provide a list to Construction Manager of all Contractor’s personnel on-site that day. The Contractor may be required to complete the SBI 212B form online at <https://www.njportal.com/njsp/212b/> for each employee who will be on site. The Contractor may be required to complete this form for each employee of any Subcontractors as well.

INSTRUCTIONS TO BIDDERS

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

The Contractor and all subcontractors of any tier 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, has 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 proof of criminal history background check for any contractor or subcontractor employee coming in regular contact with students shall be a violation of the terms of the 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.

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

31. The successful bidder shall, after contract award, 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, to the extent permitted by N.J.S.A. 18A:6-7.8, 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; shall constitute a violation of the terms of the contract; 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 N.J.S.A. 2A:58-10 et seq.

32. 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 district 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.

33. **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.

INSTRUCTIONS TO BIDDERS

34. 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 Board, 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.

- 35. The Owner's 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 financial or personal interest.
- 36. The Owner 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.
- 37. The Contractor and its Subcontractors may be debarred, suspended or disqualified from contracting and/or working on the School Facilities Project if found to have committed any of the acts listed in N.J.A.C. 17:19-4.1.
- 38. The Owner shall keep those records and accounts and shall require all Contracted Parties including the Contractor and Subcontractors to keep those records and accounts for the School Facilities Projects as necessary in order to evidence compliance with the Public Schools Contracts Law.
- 39. 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

DATE: _____

Bidder's Information: (Print or Type)

Company Name: _____

Contact Name: _____

Contact Email Address: _____

Company Address: _____

Telephone Number: _____

Fax Number: _____

**Pittsgrove Township Board of Education
1076 Almond Road
Pittsgrove, NJ 08318**

Ladies and Gentlemen:

This Proposal is submitted in accordance with your Notice to Bidders inviting proposals to be received for the **Arthur P. Schalick High School 2025 New Field House**. 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 **TOTAL LUMP SUM BASE BID (including the allowance) OF:**

BID AMOUNT \$ _____

PLUS CASH ALLOWANCE

SECTION 01210 – ALLOWANCES, ITEM 3.3.A \$ 20,000.00

TOTAL LUMP SUM BASE BID (Numbers) (Bid Amount plus Allowances)

\$ _____

(Words) _____

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

BID FORM

SUBCONTRACTOR DISCLOSURE

The Pittsgrove Township Board of Education called "Owner" in accordance with bidding requirements for the work titled **Arthur P. Schalick High School 2025 Bathroom and Locker Room Renovations and Pittsgrove Middle School 2025 Exterior Door Replacement** 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") pursuant to N.J.S.A. 18A:18A-18:

PORTION OF WORK

PRIME SUBCONTRACTOR'S NAME AND ADDRESS

Heating and Ventilating Systems and Equipment (C032)

Plumbing Work (C030)

Electrical Work (C047)

BID FORM

ALTERNATES

An alternate is an amount proposed by bidders and stated herein 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. 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.

SCHEDULE OF ALTERNATES: The Bidder shall enter the amount to be added or deducted from the base contract amount for each alternate listed below. Fill in "\$0.00" if no cost is associated with an alternate.

1. Alternate Bid #1: Provide a brick masonry veneer wainscot with cast stone sill cap at the building perimeter as shown on the elevation and section drawings. Refer to the Drawings and Specifications for a complete scope of work.

Alternate #1 – ADD \$ _____

2. Alternate Bid #2: Provide a single use toilet room within the team room. Finishes include an epoxy floor with integral epoxy base and suspended acoustical tile ceiling. Refer to the Drawings and Specifications for a complete scope of work.

Alternate #2 – ADD \$ _____

3. Alternate Bid #3: Provide Emergency Power wiring and connections to the new duplex pumping station (DPS-1) from existing panel SBH in the high school building. Panel SBH is powered by the generator. Refer to the Drawings and Specifications for a complete scope of work.

Alternate #3 – ADD \$ _____

BID FORM

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 the 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

ACKNOWLEDGMENT OF RECEIPT OF ADDENDA / CLARIFICATIONS

The undersigned Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number

Dated

Clarification Number

Dated

☐ 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, meeting or exceeding the 10 percent ownership criteria established in N.J.S.A. 52:25-24.2, has been listed. (Please attach additional sheets if more space is needed):

Name: _____

Address: _____

Name: _____

Address: _____

Name: _____

Address: _____

Name: _____

Address: _____

Name: _____

Address: _____

Name: _____

Address: _____

Name: _____

Address: _____

Name: _____

Address: _____

Name: _____

Address: _____

Name: _____

Address: _____

Part III - Ten Percent Owners of Owners Identified in Part II:

“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.

AND

- ☐ 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.

AND

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 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 meeting or 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

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 _____
Surety Company Name

Surety Company Address

as Surety, are hereby and firmly bound unto **Pittsgrove Township Board of Education, 1076 Almond Road, Pittsgrove, New Jersey 08318** 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 **Pittsgrove Township Board of Education** a certain bid, attached hereto and hereby made a part hereof to enter into a contract in writing for the **Arthur P. Schalick High School 2025 New Field House**.

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 bonds 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

Surety Company Name

By: _____

Signature

Name and Title

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, Payment Bond, and Maintenance Bond each equal to 100% of the Contract price to ensure the faithful performance on the part of the Bidder of the terms and conditions of the contract.

Title of the Work: Arthur P. Schalick High School 2025 New Field House

Location of the Project: Arthur P. Schalick High School, 718 Centerton Road, Pittsgrove, NJ 08318

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: _____

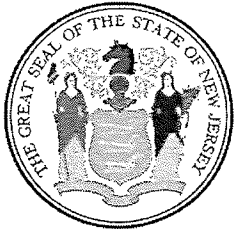
Date: _____

(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.

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

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)

Continuation Page

C. 271 POLITICAL CONTRIBUTION DISCLOSURE FORM

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

Page ____ of ____

Vendor Name:

[illegible]☐ 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: Salem

State: Governor, and Legislative Leadership Committees

Legislative District #: 3

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):

Alloway Township

Carneys Point Township

Elmer Borough

Elsinboro Township

Lower Alloways Creek Township

Mannington Township

Oldmans Township

Penns Grove Borough

Pennsville Township

Pilesgrove Township

Pittsgrove Township

Quinton Township

Salem City

Upper Pittsgrove Township

Woodstown Borough

Boards of Education (Members of the Board):

Alloway Township

Elmer Borough

Elsinboro Township

Lower Alloways Creek

Mannington Township

Oldmans Township

Penns Grove-Carney's Point Regional

Pennsville

Pittsgrove Township

Quinton Township

Salem City

Upper Pittsgrove Township

Woodstown-Pilesgrove Regional

Fire Districts (Board of Fire Commissioners):

Pittsgrove Township Fire District No. 1

Pittsgrove Township Fire District No. 2

Pittsgrove Township Fire District No. 3

HOLD HARMLESS AGREEMENT

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 and costs, in case it shall be necessary to file an action or claim or in case an action or claim is brought or made which is; 1) for personal or bodily injury, illness or death, for property damage, including loss of use, or for any economic loss and; 2) caused in whole or in part by _____ (Name of Bidder's) alleged negligent acts or omissions, breaches of contract, or otherwise arising out of their work, or those of a subcontractor, or that of anyone employed by them, or for whose acts contractor or subcontractor may be liable. Contractor's obligation hereunder 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. The Contractor's obligation hereunder shall apply even when such claims, damages, losses and expenses are caused in part by the Board of Education, its officers, employees, volunteers or agents.

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 presently debarred, suspended, declared ineligible, subject
to notice that debarment is being considered or reviewed or may be imposed, or
voluntarily excluded from public contracting by the State of New Jersey, any department
or agency thereof, or any Federal department or agency.
- () 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 above.
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 certification, 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.

Summary of the Certification Requirements under N.J.S.A. 52:32-44.1

Pursuant to state law any natural person, company, firm, association, corporation, or other entity prohibited, or “debarred,” from contracting with the federal government agencies, shall also be prohibited from contracting for public work in the state of New Jersey. This prohibition also extends to any affiliate organization(s) held by or subject to the control of an entity of that prohibited person or entity.

Prior to awarding a contract for public work a local units must obtain written certification from the contracting person or entity through the form below, attesting to their non-debarment from contracting with federal government agencies. Contracting units are reminded that they must fill-in the boilerplate information in the certification sections of Parts II through IV regarding their name and type of contracting unit before using the form.

CERTIFICATION OF NON-DEBARMENT
FOR FEDERAL GOVERNMENT CONTRACTS

N.J.S.A. 52:32-44.1 (P.L. 2019, c.406)

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

PART I: VENDOR INFORMATION	
Individual or Organization Name	
Physical Address of Individual or Organization	
Unique Entity ID (if applicable)	
CAGE/NCAGE Code (if applicable)	
Check the box that represents the type of business organization:	

- ☐ Sole Proprietorship (skip Parts III and IV) ☐ Non-Profit Corporation (skip Parts III and IV)
- ☐ For-Profit Corporation (any type) ☐ Limited Liability Company (LLC) ☐ Partnership
- ☐ Limited Partnership ☐ Limited Liability Partnership (LLP)
- ☐ Other (be specific): _____

PART II – CERTIFICATION OF NON-DEBARMENT: Individual or Organization			
<p>I hereby certify that the individual or organization listed above in Part I is not debarred by the federal government from contracting with a federal agency. I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that the Pittsgrove Township 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 the Board of Education to notify the Board of Education in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the Board of Education, permitting the Board of Education to declare any contract(s) resulting from this certification void and unenforceable.</p>			
Full Name (Print):		Title:	
Signature:		Date:	

PART III – CERTIFICATION OF NON-DEBARMENT: Individual or Entity Owning Greater than 50 Percent of Organization

Section A (Check the Box that applies)

<input type="checkbox"/>	Below is the name and address of the stockholder in the corporation who owns more than 50 percent of its voting stock, or of the partner in the partnership who owns more than 50 percent interest therein, or of the member of the limited liability company owning more than 50 percent interest therein, as the case may be.
Name of Individual or Organization	
Physical Address	

OR

<input type="checkbox"/>	No one stockholder in the corporation owns more than 50 percent of its voting stock, or no partner in the partnership owns more than 50 percent interest therein, or no member in the limited liability company owns more than 50 percent interest therein, as the case may be.
--------------------------	---

Section B (Skip if no Business entity is listed in Section A above)

<input type="checkbox"/>	Below is the name and address of the stockholder in the corporation who owns more than 50 percent of the voting stock of the organization's parent entity, or of the partner in the partnership who owns more than 50 percent interest in the organization's parent entity, or of the member of the limited liability company owning more than 50 percent interest in organization's parent entity, as the case may be.
Stockholder/Partner/Member Owning Greater Than 50 Percent of Parent Entity	
Physical Address	

OR

<input type="checkbox"/>	No one stockholder in the parent entity corporation owns more than 50 percent of its voting stock, no partner in the parent entity partnership owns more than 50 percent interest therein, or no member in the parent entity limited liability company owns more than 50 percent interest therein, as the case may be.
--------------------------	--

Section C – Part III Certification

I hereby certify that no individual or organization that is debarred by the federal government from contracting with a federal agency owns greater than 50 percent of the **Organization listed above in Part I** or, if applicable, owns greater than 50 percent of a parent entity of the **Pittsgrove Township Board of Education**. I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that the **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 **the Board of Education** to notify the **Board of Education** in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the **Board of Education**, permitting the **Board of Education** to declare any contract(s) resulting from this certification void and unenforceable.

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

Part IV – CERTIFICATION OF NON-DEBARMENT: Contractor – Controlled Entities

Section A



Below is the name and address of the corporation(s) in which the **Organization listed in Part I** owns more than 50 percent of voting stock, or of the partnership(s) in which the **Organization listed in Part I** owns more than 50 percent interest therein, or of the limited liability company or companies in which the **Organization listed above in Part I** owns more than 50 percent interest therein, as the case may be.

Name of Business Entity	Physical Address

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

OR



The **Organization listed above in Part I** does not own greater than 50 percent of the voting stock in any corporation and does not own greater than 50 percent interest in any partnership or any limited liability company.

Section B (skip if no business entities are listed in Section A of Part IV)			
<input type="checkbox"/>		Below are the names and addresses of any entities in which an entity listed in Part III A owns greater than 50 percent of the voting stock (corporation) or owns greater than 50 percent interest (partnership or limited liability company).	
Name of Business Entity Controlled by Entity Listed in Section A of Part IV		Physical Address	
Add additional Sheets if necessary			
OR			
<input type="checkbox"/>		No entity listed in Part III A owns greater than 50 percent of the voting stock in any corporation or owns greater than 50 percent interest in any partnership or limited liability company.	
Section C – Part IV Certification			
<p>I hereby certify that the Organization listed above in Part I does not own greater than 50 percent of any entity that that is debarred by the federal government from contracting with a federal agency and, if applicable, does not own greater than 50 percent of any entity that in turns owns greater than 50 percent of any entity debarred by the federal government from contracting with a federal agency. I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that the Pittsgrove Township 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 the Board of Education to notify the Board of Education in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the Board of Education , permitting the Board of Education to declare any contract(s) resulting from this certification void and unenforceable.</p>			
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.**

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 **Arthur P. Schalick High School 2025 New Field House**, and that I executed the said Bid with full authority so to do; that said bidder has 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 **Arthur P. Schalick High School 2025 New Field House** 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____

EQUIPMENT CERTIFICATION

In accordance with 18A:18A-23, The undersigned bidder hereby certifies as follows:

The bidder owns, leases or controls all necessary equipment required to accomplish the work described in the Contract Documents.

Name of Bidder: _____

Signature: _____

Name of Signor: _____

Title: _____

Date: _____

If the bidder is not the actual owner or lessee of such equipment, bidder shall provide the source(s) of such equipment and provide certifications from the owners or other persons controlling such equipment definitely granting to the bidder the control of the equipment required during such times as may be necessary for the completion of that portion of the contract for which that equipment is necessary.

Equipment Source(s):

(if any necessary equipment not owned or leased)

(entity name and physical address)

(entity name and physical address)

(entity name and physical address)

Add additional sheets if necessary for additional sources

Attach Required Certifications for Each Source

(if any necessary equipment not owned or leased)

STANDARD BID DOCUMENT REFERENCE						
Name of Form	DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN					
Statutory Reference	N.J.S.A. 52:32-55 et seq. N.J.S.A. 40A:11-2.1 N.J.S.A. 18A:18A-49.4					
Applicability		Y/N		Mandatory	Optional	N/A
	LPCL	Y	Goods and Services	X		
	PSCL	Y	Construction			X
Instructions Reference						
Description	P.L. 2012, c.25 prohibits the awarding of State and local public contracts for goods and services with persons or entities engaging in certain investment activities in energy or finance sectors of Iran. Prior to contract award, vendors and contractors must certify that neither they nor any parent entity, subsidiary, or affiliate is listed on the New Jersey Department of the Treasury's list of entities determined to be engaged in prohibited activities in Iran pursuant to P.L. 2012, c. 25 ("Chapter 25 List").					

The Certification form requires the insertion of contracting unit identification information which should be filled in (in italics on the form) prior to its use.

Disclosure of Investment Activities in Iran

Person or Entity

Part 1: Certification

COMPLETE PART 1 BY CHECKING EITHER BOX.

Pursuant to Public Law 2012, c. 25, any person or entity that is a successful bidder or proposer, or otherwise proposes to enter into or renew a contract, must complete the certification below to attest, under penalty of perjury, that neither the person or entity, nor any parent entity, subsidiary, or affiliate is identified on the State Department of Treasury's Chapter 25 list as a person or entity engaging in investment activities in Iran. The list is found on Treasury's website at www.state.nj.us/treasury/purchase/pdf/Chapter25List.pdf.

The Chapter 25 list must be reviewed prior to completing the below certification. If a vendor or contractor is found to be in violation of law, action may be taken as appropriate and as may 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.



I certify, pursuant to Public Law 2012, c. 25, that neither the person or entity listed above, nor any parent entity, subsidiary, or affiliate thereof is listed on the N.J. Department of the Treasury's list of entities determined to be engaged in prohibited activities in Iran pursuant to P.L. 2012, c. 25 ("Chapter 25 List"). I further certify that I am the person listed above, or I am an officer or representative of the entity listed above and am authorized to make this certification on its behalf. I will skip Part 2 and sign and complete the Certification below.

OR



I am unable to certify as above because the person or entity and/or a parent entity, subsidiary, or affiliate thereof is listed on the N.J. Department of the Treasury's Chapter 25 list. I will provide a detailed, accurate and precise description of the activities in Part 2 below sign and complete the Certification below.

Part 2: Additional Information

PLEASE PROVIDE FURTHER INFORMATION RELATED TO INVESTMENT ACTIVITIES IN IRAN.

You must provide a detailed, accurate and precise description of the activities of the person or entity, or a parent entity, subsidiary, or affiliate thereof engaging in investment activities in Iran below and, if more space is needed, on additional sheets provided by you.

Part 3: Certification of True and Complete Information

I, being duly sworn upon my oath, hereby represent and state that the foregoing information and any attachments there to the best of my knowledge are true and complete. I attest that I am authorized to execute this certification on behalf of the above-referenced person or entity.

*I acknowledge that the **Pittsgrove Township Board of Education** is relying on the information contained herein and thereby acknowledge that I am under a continuing obligation from the date of this certification through the completion of any contracts with the **Pittsgrove Township Board of Education** to notify the **Pittsgrove Township Board of Education** in writing of any changes to the answers of information contained herein.*

*I acknowledge 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 recognize that I am subject to criminal prosecution under the law and that it will also constitute a material breach of my agreement(s) with the **Pittsgrove Township Board of Education** and that the **Pittsgrove Township Board of Education** at its option may declare any contract(s) resulting from this certification void and unenforceable.*

Full Name (Print)		Title	
Signature		Date	



CERTIFICATION OF NON-INVOLVEMENT IN PROHIBITED ACTIVITIES IN RUSSIA OR BELARUS

Pursuant to N.J.S.A. 52:32-60.1, et seq. (L. 2022, c. 3) any person or entity (hereinafter "Vendor") that seeks to enter into or renew a contract with a State agency for the provision of goods or services, or the purchase of bonds or other obligations, must complete the certification below indicating whether or not the Vendor is identified on the Office of Foreign Assets Control (OFAC) Specially Designated Nationals and Blocked Persons list, available here: <https://sanctionssearch.ofac.treas.gov/>. If the Department of the Treasury finds that a Vendor has made a certification in violation of the law, it shall take any 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.

I, the undersigned, certify that I have read the definition of "Vendor" below, and have reviewed the Office of Foreign Assets Control (OFAC) Specially Designated Nationals and Blocked Persons list, and having done so certify:

(Check the Appropriate Box)

☐ A. That the Vendor is not identified on the OFAC Specially Designated Nationals and Blocked Persons list on account of activity related to Russia and/or Belarus.

OR

☐ B. That I am unable to certify as to "A" above, because the Vendor is identified on the OFAC Specially Designated Nationals and Blocked Persons list on account of activity related to Russia and/or Belarus.

OR

☐ C. That I am unable to certify as to "A" above, because the Vendor is identified on the OFAC Specially Designated Nationals and Blocked Persons list. However, the Vendor is engaged in activity related to Russia and/or Belarus consistent with federal law, regulation, license or exemption. A detailed description of how the Vendor's activity related to Russia and/or Belarus is consistent with federal law is set forth below.

(Attach Additional Sheets If Necessary.)

<hr/> Signature of Vendor's Authorized Representative	<hr/> Date
<hr/> Print Name and Title of Vendor's Authorized Representative	<hr/> Vendor's FEIN
<hr/> Vendor's Name	<hr/> Vendor's Phone Number
<hr/> Vendor's Address (Street Address)	<hr/> Vendor's Fax Number
<hr/> Vendor's Address (City/State/Zip Code)	<hr/> Vendor's Email Address

ⁱ Vendor means: (1) A natural person, corporation, company, limited partnership, limited liability partnership, limited liability company, business association, sole proprietorship, joint venture, partnership, society, trust, or any other nongovernmental entity, organization, or group; (2) Any governmental entity or instrumentality of a government, including a multilateral development institution, as defined in Section 1701(c)(3) of the International Financial Institutions Act, 22 U.S.C. 262r(c)(3); or (3) Any parent, successor, subunit, direct or indirect subsidiary, or any entity under common ownership or control with, any entity described in paragraph (1) or (2).

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

The Contractor and the Pittsgrove Township 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. §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 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 particulars of the claim then known by the owner. 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, or an independent violation by the owner, 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.

PERFORMANCE AND PAYMENT BOND

Bond No. _____ [Principal] _____

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

**Pittsgrove Township Board of Education
1076 Almond Road
Pittsgrove, New Jersey 08318**

(hereinafter called the "Obligee") in the penal sum of _____ [100% of the Contract Amount]
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
Arthur P. Schalick High School 2025 New Field House; which said Contract is made a part of this, the
Bond, the same as though set forth herein:

NOW THEREFORE, if the said _____ [Principal]
shall well and faithfully do and perform the things agreed by [Principal] _____ [Principal]
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 (including N.J.S.A. 2A:44-143 et seq.) and liability hereunder is as limited and expansive as said statutes provide.

Signed and Sealed this _____ day of _____, 20__.

Principal Name

Witness:

As to Principal

By: _____
Principal Signature [SEAL]

Surety Name

As to Surety

By: _____
Surety Signature [SEAL]

MAINTENANCE BOND

Bond No. _____ [Principal] _____

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

**Pittsgrove Township Board of Education
1076 Almond Road
Pittsgrove, New Jersey 08318**

(hereinafter called the "Obligee") in the penal sum of _____ [100% of the Contract Amount] _____ 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
Arthur P. Schalick High School 2025 New Field House; which said Contract is made a part of this, the
Bond, the same as though set forth herein:

NOW THEREFORE, if the said _____ [Principal] _____ shall remedy without
cost to the Obligee 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 Obligee 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 by
Obligee's final acceptance of the Principal's Work.

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.

[LEFT INTENTIONALLY BLANK]

Signed and Sealed this _____ day of _____, 20__.

Principal Name

Witness:

As to Principal

By: _____
Principal Signature [SEAL]

Surety Name

As to Surety

By: _____
Surety Signature [SEAL]

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

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:		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



AIA® Document A101™ - 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-Five

(In words, indicate day, month and year.)

BETWEEN the Owner:

(Name, legal status, address and other information)

Pittsgrove Township Board of Education
1076 Almond Road
Pittsgrove, New Jersey 08318

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)

Arthur P. Schalick High School
2025 New Field House
718 Centerton Road
Pittsgrove, NJ 08318

The Architect:

(Name, legal status, address and other information)

Garrison Architects

713 Creek Road

Bellmawr, New Jersey 08031

The Construction Manager:

GREYHAWK

2000 Midlantic Drive Suite 210

Mount Laurel, New Jersey 08054

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™-2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201™-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® 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 and all documents referenced in the Index to the Specifications (including documents submitted with the Contractor's bid unless otherwise noted), Addenda issued prior to execution of this Agreement, all documents referenced by 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

☐ 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.)

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: **The Overall Completion date is March 7, 2026 – 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:

§ 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

§ 4.2.1 Alternates described in the Contractor's submitted Bid Form and accepted by Owner at the time of award, if any, are 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

Price

A. CASH ALLOWANCE

\$20,000.00

§ 4.4 Unit prices, if any: **NOT APPLICABLE**

Unit prices are as described in the Contractor's submitted Bid Form.

§ 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 the date required by 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.

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.

§ 4.6 Other:

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

« N/A »

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 electronically submit a Pencil Copy / Rough Draft of the Application for Payment to the Architect and Construction Manager for review no later than the 15 calendar days prior to the first Friday of the month payment is requested from Owner.

Architect and Construction Manager 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 the Pencil / Rough Draft of the Application for Payment from the Architect, the Contractor shall electronically submit the Certified Applications for Payment consistent with the Architect's markup on the Pencil / Rough Draft to the Architect for signature.

.2. The Architect shall, if finding payment for the amount submitted is appropriate under the Contract Documents, sign the Certified Application for Payment within five (5) calendar days upon receipt and electronically transmit the Certified Application for Payment to the Construction Manager by Tuesday (3 calendar days) before the first Friday of the month payment is requested from Owner.

.3 The Construction Manager shall electronically transmit the Certified Application for Payment to the Owner on the first Friday of the month payment is requested. The Construction Manager shall electronically transmit the signed Certified Application for Payment to the Contractor. (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. Payroll certification for the project must be completed online at <https://njwages.nj.gov/>. The Contractor will be required to submit the certified payroll via the Hub and via hard copy to Pittsgrove Township Board of Education for itself and its subcontractors. The payroll records shall indicate the proper classification of employees and the payment of overtime, if any. These records shall include certified payrolls for each of Contractor's subcontractors of any tier. 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 unless the Contractor has performed in accordance with the Contract Documents and is not required to provide approval until the next scheduled public meeting of the Board of Education following the Owner's receipt of the Architect's Certificate for Payment. Under the 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 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 the Owner has failed to make payments required by the Act must be submitted to mediation unless the Owner and Contractor waive such requirement in writing at the time the dispute arises, notwithstanding anything to the contrary in the Contract Documents. The Owner and Contractor shall make a good faith effort to agree on a mediator. If the Owner and Contractor are unable to agree on a mediator, the Owner and Contractor shall each select a neutral performing service in the State of New Jersey and such neutrals shall in turn select the mediator. Owner and Contractor shall each be responsible for their own mediation costs, including one-half of the mediator's compensation. Such mediation shall apply to disputes over payments asserted to be required from Owner under the Act only and shall not apply to disputes concerning any other matters that may arise under, from or in relation to this Contract or Project. Any civil action arising under, from or in relation to this Contract or Project shall be conducted in the Superior Court for the State of New Jersey and venued in Salem County, New Jersey.

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work, including those items referenced in Section 9.2.2 of AIA Document A201™-2017, General Conditions of the Contract for Construction as modified (the "A201"). 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 the A201, 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 the A201;
- .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 the A201; 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.)

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), and 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 and finally completed and no unsettled claims exist.

§ 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 Final 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.

(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 the A201.

§ 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 the A201, 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 as follows:

« Final payment shall be approved, if appropriate, at the next scheduled public meeting of the School Board following the provision to Owner of Architect's final Certificate of Payment. Final payment after approval shall be made during the School Board's subsequent payment cycle. »

§ 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.)

Zero percent (0%) except to the extent and in the amount required by N.J.S.A. 2A:30A-2(c) as to any particular payment.

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of the A201, 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

The method of binding dispute resolution for disputes arising out of, under or relating to this Contract or the Project 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 Salem County. New Jersey law shall apply to all disputes arising out of, under or relating to this Contract or the Project without respect to the conflict of law principles thereof.

☐ 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 the A201.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with the A201, then the Owner shall, after the Site and Work are secured and protected, 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.)

« The amount due Contractor for the Work performed through the date of termination as dictated by the schedule of values, retainage on such amounts, and such amounts as are reasonably necessary to secure and protect the Site and the Work. This shall be the Contractor's sole compensation for termination for convenience by Owner. Timing of the payment shall be in the same manner as Final Payment under Article 5.

Under no circumstances shall Contractor be entitled to any other compensation or termination fee where Owner has terminated for convenience whether for work contemplated but not performed or for any other reason, cause, or expense.»

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

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of the A201 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)

Darren Harris
Pittsgrove Township Board of Education
1076 Almond Road
Pittsgrove, New Jersey 08318

§ 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 the A201 and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in the A201 and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format may be given in accordance with the below:

« Subject to the limitations set forth in the A201 (specifically Section 1.6 thereof), notice may be given electronically to (i) the Owner, Architect or Construction Manager by the Contractor via email to: the email address for Owner's Representative in Section 8.2; the email address provided by Construction Manager following the award of the project to Contractor; and the email address provided by Architect following the award of the project to Contractor; and (ii) the Contractor by Owner, Architect, or Construction Manager via email to: the email address for Contractor's Representative in Section 8.3.

§ 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 and 5.3 of this Agreement.
2. The within contract shall be governed by and interpreted pursuant to the laws of the State of New Jersey without respect to the conflict of law principles thereof.
3. 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.
4. 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.
5. 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.

6. 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.
7. 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 of this paragraph, "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.
8. 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 the A201). 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.
9. 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.
10. 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.
11. 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 and protection of the Subcontractor's Work, which the Contractor, by the Contract Documents, assumes toward the Owner and its consultants.
12. Unpaid Lien Balance
 - a. To the fullest extent permitted by law, the Contractor shall not suffer or permit any Construction Lien (including a Construction Lien, *lis pendens*, or other encumbrance or cloud on title), Notice of Unpaid Balance and Right to File Lien ("NUB") or Municipal Mechanics' Lien 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, as to a Municipal Mechanics' Lien, 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 Municipal Mechanics' Lien under the Contract Documents), Contractor shall within ten (10) days of receipt of notice of said Construction Lien, NUB or Municipal Mechanics' Lien cause same to be discharged, satisfied and/or bonded and, in default thereof, Owner shall have the right to bond said Construction Lien, NUB or Municipal Mechanics' Lien or otherwise discharge same (provided that Owner shall only pay and satisfy any Construction Lien, NUB or Municipal Mechanics' Lien if, within twenty (20) days from the earlier of (a) service of the lien claim on Contractor or (b) written notice from the Owner to Contractor or Subcontractor (where applicable), 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, to retain out of any payment then due or thereafter to become due to Contractor 110% of the amount of such lien). Nothing in this paragraph shall reduce or limit Contractor's obligation to eliminate Construction Liens, NUBs or Municipal Mechanics' liens as provided elsewhere in this Paragraph 12.
- c. Should a Construction Lien, NUB and/or Municipal Mechanics' Lien be filed by a Subcontractor or Supplier of any tier or any entity or person 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, NUB and/or Municipal Mechanics' Lien. 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 Indemnitees 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.

13. In the event the Contractor fails or refuses to discharge any NUB, Construction Lien, Municipal Mechanics' Lien, (for a Municipal Mechanics' Lien, as to 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 Municipal Mechanics' Lien, NUB or Construction Lien 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, Construction Lien or Municipal Mechanics' lien (c) pay the amount set forth in the NUB, Construction Lien or Municipal Mechanics' Lien and deduct this amount from amounts otherwise owed to the Contractor under the Contract; and/or (d) obtain a discharge of the NUB, Construction Lien or Municipal Mechanics' Lien, in any matter permitted under the New Jersey 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 or the A201.
14. 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 and documents referenced in Article 1 of the same.
- .2 The A201.
- .3 Drawings – **SEE THE ATTACHED INDEX**
- .4 Specifications **SEE THE ATTACHED INDEX**
- .5 Addenda, if any:

Number	Date	Pages
--------	------	-------

.6 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: **AS INCORPORATED INTO THE A201.**

.7 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.

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® Document A201® – 2017

General Conditions of the Contract for Construction

TABLE OF ARTICLES

1	GENERAL PROVISIONS
2	OWNER
3	CONTRACTOR
4	ARCHITECT
5	SUBCONTRACTORS
6	CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
7	CHANGES IN THE WORK
8	TIME
9	PAYMENTS AND COMPLETION
10	PROTECTION OF PERSONS AND PROPERTY
11	INSURANCE AND BONDS
12	UNCOVERING AND CORRECTION OF WORK
13	MISCELLANEOUS PROVISIONS
14	TERMINATION OR SUSPENSION OF THE CONTRACT
15	CLAIMS AND DISPUTES

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INDEX

(Topics and numbers in bold are Section headings.)

Acceptance of Nonconforming Work

9.6.6, 9.9.3, **12.3**

Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, **12.3**

Access to Work

3.16, 6.2.1, **12.1**

Accident Prevention

10

Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5, 10.2.8, 13.3.2, 14.1, 15.1.2, 15.2

Addenda

1.1.1

Additional Costs, Claims for

3.7.4, 3.7.5, 10.3.2, 15.1.5

Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, **13.4**

Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.6**

Administration of the Contract

3.1.3, **4.2**, 9.4, 9.5

Advertisement or Invitation to Bid

1.1.1

Aesthetic Effect

4.2.13

Allowances

3.8

Applications for Payment

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.5.4, 9.6.3, 9.7, 9.10

Approvals

2.1.1, 2.3.1, 2.5, 3.1.3, 3.10.2, 3.12.8, 3.12.9, 3.12.10.1, 4.2.7, 9.3.2, 13.4.1

Arbitration

8.3.1, 15.3.2, **15.4**

ARCHITECT

4

Architect, Definition of

4.1.1

Architect, Extent of Authority

2.5, 3.12.7, 4.1.2, 4.2, 5.2, 6.3, 7.1.2, 7.3.4, 7.4, 9.2, 9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1, 13.4.1, 13.4.2, 14.2.2, 14.2.4, 15.1.4, 15.2.1

Architect, Limitations of Authority and Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3, 4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2, 9.5.4, 9.6.4, 15.1.4, 15.2

Architect's Additional Services and Expenses

2.5, 12.2.1, 13.4.2, 13.4.3, 14.2.4

Architect's Administration of the Contract

3.1.3, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals

2.5, 3.1.3, 3.5, 3.10.2, 4.2.7

Architect's Authority to Reject Work

3.5, 4.2.6, 12.1.2, 12.2.1

Architect's Copyright

1.1.7, 1.5

Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3, 7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1, 13.4.2, 15.2

Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.4

Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.4.2

Architect's Interpretations

4.2.11, 4.2.12

Architect's Project Representative

4.2.10

Architect's Relationship with Contractor

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.2, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.3.2, 13.4, 15.2

Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3

Architect's Representations

9.4.2, 9.5.1, 9.10.1

Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4

Asbestos

10.3.1

Attorneys' Fees

3.18.1, 9.6.8, 9.10.2, 10.3.3

Award of Separate Contracts

6.1.1, 6.1.2

Award of Subcontracts and Other Contracts for Portions of the Work

5.2

Basic Definitions

1.1

Bidding Requirements

1.1.1

Binding Dispute Resolution

8.3.1, 9.7, 11.5, 13.1, 15.1.2, 15.1.3, 15.2.1, 15.2.5, 15.2.6.1, 15.3.1, 15.3.2, 15.3.3, 15.4.1

Bonds, Lien

7.3.4.4, 9.6.8, 9.10.2, 9.10.3

Bonds, Performance, and Payment

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**, 11.1.3, **11.5**

Building Information Models Use and Reliance

1.8

Building Permit

3.7.1

Capitalization

1.3

Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

Certificates for Payment

4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.4

Certificates of Inspection, Testing or Approval
13.4.4

Certificates of Insurance
9.10.2

Change Orders

1.1.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.7, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.2, 11.5, 12.1.2

Change Orders, Definition of

7.2.1

CHANGES IN THE WORK

2.2.2, 3.11, 4.2.8, 7, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.5

Claims, Definition of

15.1.1

Claims, Notice of
1.6.2, 15.1.3

CLAIMS AND DISPUTES

3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4
Claims and Timely Assertion of Claims
15.4.1

Claims for Additional Cost

3.2.4, 3.3.1, 3.7.4, 7.3.9, 9.5.2, 10.2.5, 10.3.2, **15.1.5**

Claims for Additional Time

3.2.4, 3.3.1, 3.7.4, 6.1.1, 8.3.2, 9.5.2, 10.3.2, **15.1.6**

Concealed or Unknown Conditions, Claims for

3.7.4

Claims for Damages
3.2.4, 3.18, 8.3.3, 9.5.1, 9.6.7, 10.2.5, 10.3.3, 11.3, 11.3.2, 14.2.4, 15.1.7

Claims Subject to Arbitration
15.4.1

Cleaning Up

3.15, 6.3

Commencement of the Work, Conditions Relating to
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.2, **15.1.5**

Commencement of the Work, Definition of
8.1.2

Communications

3.9.1, **4.2.4**

Completion, Conditions Relating to
3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 14.1.2, 15.1.2

COMPLETION, PAYMENTS AND

9

Completion, Substantial
3.10.1, 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 15.1.2
Compliance with Laws
2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3

Concealed or Unknown Conditions

3.7.4, 4.2.8, 8.3.1, 10.3

Conditions of the Contract

1.1.1, 6.1.1, 6.1.4

Consent, Written

3.4.2, 3.14.2, 4.1.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 13.2, 15.4.4.2

Consolidation or Joinder

15.4.4

CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

1.1.4, 6

Construction Change Directive, Definition of
7.3.1

Construction Change Directives

1.1.1, 3.4.2, 3.11, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, **7.3**, 9.3.1.1

Construction Schedules, Contractor's

3.10, 3.11, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2

Contingent Assignment of Subcontracts

5.4, 14.2.2.2

Continuing Contract Performance

15.1.4

Contract, Definition of

1.1.2

CONTRACT, TERMINATION OR SUSPENSION OF THE

5.4.1.1, 5.4.2, 11.5, **14**

Contract Administration

3.1.3, 4, 9.4, 9.5

Contract Award and Execution, Conditions Relating to

3.7.1, 3.10, 5.2, 6.1

Contract Documents, Copies Furnished and Use of
1.5.2, 2.3.6, 5.3

Contract Documents, Definition of

1.1.1

Contract Sum

2.2.2, 2.2.4, 3.7.4, 3.7.5, 3.8, 3.10.2, 5.2.3, 7.3, 7.4, **9.1**, 9.2, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.5, 12.1.2, 12.3, 14.2.4, 14.3.2, 15.1.4.2, **15.1.5**, **15.2.5**

Contract Sum, Definition of

9.1

Contract Time

1.1.4, 2.2.1, 2.2.2, 3.7.4, 3.7.5, 3.10.2, 5.2.3, 6.1.5, 7.2.1.3, 7.3.1, 7.3.5, 7.3.6, 7, 7, 7.3.10, 7.4, 8.1.1, 8.2.1, 8.2.3, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 12.1.2, 14.3.2, 15.1.4.2, 15.1.6.1, 15.2.5

Contract Time, Definition of

8.1.1

CONTRACTOR

3

Contractor, Definition of

3.1, **6.1.2**

Contractor's Construction and Submittal Schedules

3.10, 3.12.1, 3.12.2, 4.2.3, 6.1.3, 15.1.6.2

Contractor's Employees
2.2.4, 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2,
10.3, 11.3, 14.1, 14.2.1.1

Contractor's Liability Insurance

11.1

Contractor's Relationship with Separate Contractors
and Owner's Forces

3.12.5, 3.14.2, 4.2.4, 6, 11.3, 12.2.4

Contractor's Relationship with Subcontractors

1.2.2, 2.2.4, 3.3.2, 3.18.1, 3.18.2, 4.2.4, 5, 9.6.2, 9.6.7,
9.10.2, 11.2, 11.3, 11.4

Contractor's Relationship with the Architect

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2,
3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.2, 5.2, 6.2.2,
7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3,
11.3, 12, 13.4, 15.1.3, 15.2.1

Contractor's Representations

3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2

Contractor's Responsibility for Those Performing the
Work

3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8

Contractor's Review of Contract Documents

3.2

Contractor's Right to Stop the Work

2.2.2, 9.7

Contractor's Right to Terminate the Contract

14.1

Contractor's Submittals

3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2,
9.8.3, 9.9.1, 9.10.2, 9.10.3

Contractor's Superintendent

3.9, 10.2.6

Contractor's Supervision and Construction

Procedures

1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3,
7.3.4, 7.3.6, 8.2, 10, 12, 14, 15.1.4

Coordination and Correlation

1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1

Copies Furnished of Drawings and Specifications

1.5, 2.3.6, 3.11

Copyrights

1.5, **3.17**

Correction of Work

2.5, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**, 12.3,
15.1.3.1, 15.1.3.2, 15.2.1

Correlation and Intent of the Contract Documents

1.2

Cost, Definition of

7.3.4

Costs

2.5, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3,
7.3.3.3, 7.3.4, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.2,
12.1.2, 12.2.1, 12.2.4, 13.4, 14

Cutting and Patching

3.14, 6.2.5

Damage to Construction of Owner or Separate
Contractors

3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damage to the Work

3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damages, Claims for

3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.3.2,
11.3, 14.2.4, 15.1.7

Damages for Delay

6.2.3, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 14.3.2

Date of Commencement of the Work, Definition of
8.1.2

Date of Substantial Completion, Definition of
8.1.3

Day, Definition of

8.1.4

Decisions of the Architect

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 6.3, 7.3.4,
7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.4.2,
14.2.2, 14.2.4, 15.1, 15.2

Decisions to Withhold Certification

9.4.1, **9.5**, 9.7, 14.1.1.3

Defective or Nonconforming Work, Acceptance,
Rejection and Correction of

2.5, 3.5, 4.2.6, 6.2.3, 9.5.1, 9.5.3, 9.6.6, 9.8.2, 9.9.3,
9.10.4, 12.2.1

Definitions

1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 5.1,
6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1

Delays and Extensions of Time

3.2, **3.7.4**, 5.2.3, 7.2.1, 7.3.1, **7.4**, **8.3**, 9.5.1, **9.7**,
10.3.2, **10.4**, 14.3.2, **15.1.6**, 15.2.5

Digital Data Use and Transmission

1.7

Disputes

6.3, 7.3.9, 15.1, 15.2

Documents and Samples at the Site

3.11

Drawings, Definition of

1.1.5

Drawings and Specifications, Use and Ownership of
3.11

Effective Date of Insurance

8.2.2

Emergencies

10.4, 14.1.1.2, **15.1.5**

Employees, Contractor's

3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2,
10.3.3, 11.3, 14.1, 14.2.1.1

Equipment, Labor, or Materials

1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,
4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3,
9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Execution and Progress of the Work

1.1.3, 1.2.1, 1.2.2, 2.3.4, 2.3.6, 3.1, 3.3.1, 3.4.1, 3.7.1,
3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.6, 8.2, 9.5.1,
9.9.1, 10.2, 10.3, 12.1, 12.2, 14.2, 14.3.1, 15.1.4

Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2, 10.4, 14.3, 15.1.6, **15.2.5**

Failure of Payment
9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

Faulty Work
(See Defective or Nonconforming Work)

Final Completion and Final Payment
4.2.1, 4.2.9, 9.8.2, **9.10**, 12.3, 14.2.4, 14.4.3

Financial Arrangements, Owner's
2.2.1, 13.2.2, 14.1.1.4

GENERAL PROVISIONS

1

Governing Law

13.1
Guarantees (See Warranty)

Hazardous Materials and Substances
10.2.4, **10.3**

Identification of Subcontractors and Suppliers
5.2.1

Indemnification
3.17, **3.18**, 9.6.8, 9.10.2, 10.3.3, 11.3

Information and Services Required of the Owner
2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10.1, 6.1.3, 6.1.4, 6.2.5, 9.6.1, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4

Initial Decision
15.2

Initial Decision Maker, Definition of
1.1.8
Initial Decision Maker, Decisions
14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Initial Decision Maker, Extent of Authority
14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

Injury or Damage to Person or Property
10.2.8, 10.4

Inspections
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 12.2.1, 13.4

Instructions to Bidders
1.1.1

Instructions to the Contractor
3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.4.2

Instruments of Service, Definition of
1.1.7

Insurance
6.1.1, 7.3.4, 8.2.2, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 10.2.5, **11**

Insurance, Notice of Cancellation or Expiration
11.1.4, 11.2.3

Insurance, Contractor's Liability
11.1
Insurance, Effective Date of
8.2.2, 14.4.2

Insurance, Owner's Liability
11.2

Insurance, Property
10.2.5, 11.2, 11.4, 11.5

Insurance, Stored Materials
9.3.2

INSURANCE AND BONDS
11

Insurance Companies, Consent to Partial Occupancy
9.9.1

Insured loss, Adjustment and Settlement of
11.5

Intent of the Contract Documents
1.2.1, 4.2.7, 4.2.12, 4.2.13

Interest
13.5

Interpretation
1.1.8, 1.2.3, **1.4**, 4.1.1, 5.1, 6.1.2, 15.1.1

Interpretations, Written
4.2.11, 4.2.12

Judgment on Final Award
15.4.2

Labor and Materials, Equipment
1.1.3, 1.1.6, **3.4**, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Labor Disputes
8.3.1

Laws and Regulations
1.5, 2.3.2, 3.2.3, 3.2.4, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1, 10.2.2, 13.1, 13.3.1, 13.4.2, 13.5, 14, 15.2.8, 15.4

Liens
2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

Limitations, Statutes of
12.2.5, 15.1.2, 15.4.1.1

Limitations of Liability
3.2.2, 3.5, 3.12.10, 3.12.10.1, 3.17, 3.18.1, 4.2.6, 4.2.7, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 9.6.8, 10.2.5, 10.3.3, 11.3, 12.2.5, 13.3.1

Limitations of Time
2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7, 5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15, 15.1.2, 15.1.3, 15.1.5

Materials, Hazardous
10.2.4, **10.3**

Materials, Labor, Equipment and
1.1.3, 1.1.6, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2

Means, Methods, Techniques, Sequences and Procedures of Construction
3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2

Mechanic's Lien
2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

Mediation
8.3.1, 15.1.3.2, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1, 15.4.1.1

Minor Changes in the Work
1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1, **7.4**

MISCELLANEOUS PROVISIONS

13

Modifications, Definition of

1.1.1

Modifications to the Contract

1.1.1, 1.1.2, 2.5, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2

Mutual Responsibility

6.2

Nonconforming Work, Acceptance of

9.6.6, 9.9.3, **12.3**

Nonconforming Work, Rejection and Correction of
2.4, 2.5, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2

Notice

1.6, 1.6.1, 1.6.2, 2.1.2, 2.2.2, 2.2.3, 2.2.4, 2.5, 3.2.4, 3.3.1, 3.7.4, 3.7.5, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 7.4, 8.2.2, 9.6.8, 9.7, 9.10.1, 10.2.8, 10.3.2, 11.5, 12.2.2.1, 13.4.1, 13.4.2, 14.1, 14.2.2, 14.4.2, 15.1.3, 15.1.5, 15.1.6, 15.4.1

Notice of Cancellation or Expiration of Insurance

11.1.4, 11.2.3

Notice of Claims

1.6.2, 2.1.2, 3.7.4, 9.6.8, 10.2.8, **15.1.3**, 15.1.5, 15.1.6, 15.2.8, 15.3.2, 15.4.1

Notice of Testing and Inspections

13.4.1, 13.4.2

Observations, Contractor's

3.2, 3.7.4

Occupancy

2.3.1, 9.6.6, 9.8

Orders, Written

1.1.1, 2.4, 3.9.2, 7, 8.2.2, 11.5, 12.1, 12.2.2.1, 13.4.2, 14.3.1

OWNER

2

Owner, Definition of

2.1.1

Owner, Evidence of Financial Arrangements

2.2, 13.2.2, 14.1.1.4

Owner, Information and Services Required of the

2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4

Owner's Authority

1.5, 2.1.1, 2.3.2.4, 2.5, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.4, 11.5, 12.2.2, 12.3, 13.2.2, 14.3, 14.4, 15.2.7

Owner's Insurance

11.2

Owner's Relationship with Subcontractors

1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2

Owner's Right to Carry Out the Work

2.5, 14.2.2

Owner's Right to Clean Up

6.3

Owner's Right to Perform Construction and to Award Separate Contracts

6.1

Owner's Right to Stop the Work

2.4

Owner's Right to Suspend the Work

14.3

Owner's Right to Terminate the Contract

14.2, 14.4

Ownership and Use of Drawings, Specifications and Other Instruments of Service

1.1.1, 1.1.6, 1.1.7, **1.5**, 2.3.6, 3.2.2, 3.11, 3.17, 4.2.12, 5.3

Partial Occupancy or Use

9.6.6, **9.9**

Patching, Cutting and

3.14, 6.2.5

Patents

3.17

Payment, Applications for

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3

Payment, Certificates for

4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4

Payment, Failure of

9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

Payment, Final

4.2.1, 4.2.9, **9.10**, 12.3, 14.2.4, 14.4.3

Payment Bond, Performance Bond and

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**

Payments, Progress

9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4

PAYMENTS AND COMPLETION

9

Payments to Subcontractors

5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2

PCB

10.3.1

Performance Bond and Payment Bond

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**

Permits, Fees, Notices and Compliance with Laws

2.3.1, **3.7**, 3.13, 7.3.4.4, 10.2.2

PERSONS AND PROPERTY, PROTECTION OF

10

Polychlorinated Biphenyl

10.3.1

Product Data, Definition of

3.12.2

Product Data and Samples, Shop Drawings

3.11, **3.12**, 4.2.7

Progress and Completion

4.2.2, **8.2**, 9.8, 9.9.1, 14.1.4, 15.1.4

Progress Payments

9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4

Project, Definition of

1.1.4

Project Representatives

4.2.10

Property Insurance

10.2.5, 11.2

Proposal Requirements

1.1.1

PROTECTION OF PERSONS AND PROPERTY

10

Regulations and Laws

1.5, 2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1, 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14, 15.2.8, 15.4

Rejection of Work

4.2.6, 12.2.1

Releases and Waivers of Liens

9.3.1, 9.10.2

Representations

3.2.1, 3.5, 3.12.6, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.10.1

Representatives

2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.10, 13.2.1

Responsibility for Those Performing the Work

3.3.2, 3.18, 4.2.2, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10

Retainage

9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3

Review of Contract Documents and Field

Conditions by Contractor

3.2, 3.12.7, 6.1.3

Review of Contractor's Submittals by Owner and Architect

3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2

Review of Shop Drawings, Product Data and Samples by Contractor

3.12

Rights and Remedies

1.1.2, 2.4, 2.5, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.1, 12.2.2, 12.2.4, 13.3, 14, 15.4

Royalties, Patents and Copyrights

3.17

Rules and Notices for Arbitration

15.4.1

Safety of Persons and Property

10.2, 10.4

Safety Precautions and Programs

3.3.1, 4.2.2, 4.2.7, 5.3, 10.1, 10.2, 10.4

Samples, Definition of

3.12.3

Samples, Shop Drawings, Product Data and

3.11, 3.12, 4.2.7

Samples at the Site, Documents and

3.11

Schedule of Values

9.2, 9.3.1

Schedules, Construction

3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2

Separate Contracts and Contractors

1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2

Separate Contractors, Definition of

6.1.1

Shop Drawings, Definition of

3.12.1

Shop Drawings, Product Data and Samples

3.11, 3.12, 4.2.7

Site, Use of

3.13, 6.1.1, 6.2.1

Site Inspections

3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.9.2, 9.4.2, 9.10.1, 13.4

Site Visits, Architect's

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4

Special Inspections and Testing

4.2.6, 12.2.1, 13.4

Specifications, Definition of

1.1.6

Specifications

1.1.1, 1.1.6, 1.2.2, 1.5, 3.12.10, 3.17, 4.2.14

Statute of Limitations

15.1.2, 15.4.1.1

Stopping the Work

2.2.2, 2.4, 9.7, 10.3, 14.1

Stored Materials

6.2.1, 9.3.2, 10.2.1.2, 10.2.4

Subcontractor, Definition of

5.1.1

SUBCONTRACTORS

5

Subcontractors, Work by

1.2.2, 3.3.2, 3.12.1, 3.18, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7

Subcontractual Relations

5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1

Submittals

3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.4, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3

Submittal Schedule

3.10.2, 3.12.5, 4.2.7

Subrogation, Waivers of

6.1.1, 11.3

Substances, Hazardous

10.3

Substantial Completion

4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 15.1.2

Substantial Completion, Definition of

9.8.1

Substitution of Subcontractors

5.2.3, 5.2.4

Substitution of Architect

2.3.3

Substitutions of Materials

3.4.2, 3.5, 7.3.8

Sub-subcontractor, Definition of

5.1.2

Subsurface Conditions

3.7.4

Successors and Assigns

13.2

Superintendent

3.9, 10.2.6

Supervision and Construction Procedures

1.2.2, **3.3**, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.4

Suppliers

1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.5.4, 9.6, 9.10.5, 14.2.1

Surety

5.4.1.2, 9.6.8, 9.8.5, 9.10.2, 9.10.3, 11.1.2, 14.2.2, 15.2.7

Surety, Consent of

9.8.5, 9.10.2, 9.10.3

Surveys

1.1.7, 2.3.4

Suspension by the Owner for Convenience

14.3

Suspension of the Work

3.7.5, 5.4.2, 14.3

Suspension or Termination of the Contract

5.4.1.1, 14

Taxes

3.6, 3.8.2.1, 7.3.4.4

Termination by the Contractor

14.1, 15.1.7

Termination by the Owner for Cause

5.4.1.1, **14.2**, 15.1.7

Termination by the Owner for Convenience

14.4

Termination of the Architect

2.3.3

Termination of the Contractor Employment

14.2.2

TERMINATION OR SUSPENSION OF THE CONTRACT

14

Tests and Inspections

3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 12.2.1, **13.4**

TIME

8

Time, Delays and Extensions of

3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, **8.3**, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5

Time Limits

2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15.1.2, 15.1.3, 15.4

Time Limits on Claims

3.7.4, 10.2.8, 15.1.2, 15.1.3

Title to Work

9.3.2, 9.3.3

UNCOVERING AND CORRECTION OF WORK

12

Uncovering of Work

12.1

Unforeseen Conditions, Concealed or Unknown

3.7.4, 8.3.1, 10.3

Unit Prices

7.3.3.2, 9.1.2

Use of Documents

1.1.1, 1.5, 2.3.6, 3.12.6, 5.3

Use of Site

3.13, 6.1.1, 6.2.1

Values, Schedule of

9.2, 9.3.1

Waiver of Claims by the Architect

13.3.2

Waiver of Claims by the Contractor

9.10.5, 13.3.2, **15.1.7**

Waiver of Claims by the Owner

9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.3.2, 14.2.4, **15.1.7**

Waiver of Consequential Damages

14.2.4, 15.1.7

Waiver of Liens

9.3, 9.10.2, 9.10.4

Waivers of Subrogation

6.1.1, **11.3**

Warranty

3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.2, 9.10.4, 12.2.2, 15.1.2

Weather Delays

8.3, 15.1.6.2

Work, Definition of

1.1.3

Written Consent

1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3, 13.2, 13.3.2, 15.4.4.2

Written Interpretations

4.2.11, 4.2.12

Written Orders

1.1.1, 2.4, 3.9, 7, 8.2.2, 12.1, 12.2, 13.4.2, 14.3.1

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect.

§1.1.1.1 The Contract Documents shall include, 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 timely complete the Work for the Contract Sum; 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 and for the Work to be 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. Whether or not Contractor visits the site, Contractor shall be charged with such knowledge as would have been obtainable from a thorough site visit and inspection.

§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, shall be subject to the Architect's approval, and shall not result in the extension of the Contract Time or additional compensation.

- .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 or extensions of Contract Time.
- .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, architectural, structural and other 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 or extensions of Contract Time.

§ 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 Contract Documents 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 or useful 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 by Contractor, consistent with the requirements of the Contract Documents, 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.
- .3 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.

§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 Contractor is aware of specified requirements and all materials or products within its bid are equal or better than such specified items. The Contractor is aware that any pricing decisions utilizing substitutes are at Contractor's own risk that the Architect and/or the Owner will find the substitutes not equal or better than the specified items; in such cases the Contractor shall use the specified items or seek approval of different products asserted to be equal to or better than the specified items. In no event shall Contractor's requests to use substitutes delay Contractor's performance or entitle Contractor to an extension of the Contract Time.

§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 in this document or the Agreement, (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 maintenance or repair of or 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.

§ 1.6 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. All notices to Owner, Architect or Construction Manager shall be provided to each of the Owner, Architect and Construction Manager.

§ 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. In addition, Notices of Claims shall also be provided by electronic transmission.

§ 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.

§ 1.8 INTENTIONALLY OMITTED

§ 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. Execution of the Agreement and performance thereunder by Contractor shall constitute Contractor's acceptance of all unsigned Contract Documents as if they were fully executed, but this shall not impact Contractor's obligation to sign such documents. The Agreement shall be signed in not less than triplicate by the Owner and Contractor.

§ 1.9.2 Submission of a bid 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 and 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 and Final 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; (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; and (4) the condition of existing and planned structures on the site and the ability, safety and appropriateness of same to receive the Work in the manner required by the Contract Documents. The potential that such physical, practical and intangible conditions are not as understood by Contractor at the time of its bid or that such physical, practical and intangible conditions may change during the course of performance, and the costs associated with such potential, are risks borne and accepted by Contractor. In connection with the foregoing and the remainder of the Contract Documents, 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, errors, omissions, ambiguities, or conflicts in said Contract Documents, has correlated its personal observations with the requirements of the Contract Documents, and that if it becomes aware of any discrepancies, errors, omissions, ambiguities, or conflicts, it will promptly notify Owner and Architect of such fact. The Contractor shall not be entitled to additional compensation or an extension of the Contract Time as a result of any of the foregoing.

§ 1.9.3 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. The failure of a Contractor to provide notice of such a conflict prior to the question deadline in the Notice to Bidders shall constitute an absolute bar to the assertion of a claim based on the presence such conflict.

1.9.3.1 To "provide" work means to furnish and install, complete, in place and ready for use.

1.9.3.2 The Contractor shall request, from the Architect/Engineer's interpretation of apparent discrepancies, errors, 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.

§1.9.3.3 Explanatory notes shall take precedence over conflicting drawn note indications.

§1.9.4 When more than one material, brand, or process is specified for a particular item of Work, the choice shall be the Contractor's. Contractor shall, 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.

§1.9.5 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.

§1.9.6 When a profile, section or other finished condition is shown, furring or other method of obtaining such finished conditions shall be provided.

§1.9.7 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. If there is any variance between the manufacturers' instructions, directions or specifications and the Specifications, the Contractor shall seek clarification from the Architect.

§1.9.8 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.

§1.9.9 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 it 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 it and over the Work and the site of the Project;
- .2 that it is familiar with all Federal, State, Municipal and Owner 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 it, can be satisfactorily constructed and used for the purposes for which it is intended;
- .4 that it is familiar with local trade jurisdictional practices at the site of the project;
- .5 that it has carefully examined the plans; the specifications and the site of the work, and that from his own investigations, it has satisfied itself as to the nature and location of the work, the character, quality and quantity of the surface and subsurface materials 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 it has determined what local ordinances, if any, will affect his work. It 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 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 INTENTIONALLY OMITTED

§ 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 only on the accuracy of the legal limitations furnished by the Owner and 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 or concerning the structures on/in which 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 or concerning the structures on/in which 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 accurate or that the indicated conditions are representative of those existing throughout the areas or structures 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 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 or funds by anyone claiming by, through, or under Contractor, disregards the instructions of Architect or Owner when based on the requirements of the Contract Documents or otherwise violates any terms and conditions 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.

§ 2.4.1 Notwithstanding anything else in the Contract Documents, 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 is no obligation to provide Contractor an opportunity to cure required for corrective actions necessary to protect the Owner's interest in education, safety and security.

§ 2.5 Owner's Right to Carry Out the Work

§ 2.5.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and (i) fails within a seven-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness or (ii) Owner and Architect reasonably believe that such correction cannot be properly completed within a seven-day period, 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 and Construction Manager'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 its Surety shall pay the difference to the Owner.

§ 2.5.2 The Owner's rights and remedies stated in Sections 2.4, 2.5 and elsewhere in the Contract Documents are cumulative and not in limitation of any other rights or remedies 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 Contractor is responsible for supervisory control over and allocation and coordination of all Subcontractors and trades, performance and completion of all portions of the Work, including cooperation with those doing portions of the Project under Separate Contracts with the Owner.

§ 3.1.2 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.

§ 3.1.3 Standard of Care: The Contractor shall exercise the highest and best skill, judgment, and care of a contractor performing work of the type required by the Contract Documents. Contractor acknowledges that this provision requires that it perform with more than a mere "reasonable" standard of care.

§ 3.2 Requests for Information; Field Conditions

§ 3.2.1 If the Contractor requires clarification of the intent of the Contract Documents after award, the Contractor shall be responsible to issue a typewritten request for information (RFI) to the Architect and Construction Manager utilizing the Architect or Construction Manager's sample form via acceptable methods set forth in Article 4.2.

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. 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. 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. If the Contractor performs any construction activity involving an error, inconsistency, legal nonconformity, or omission in the Contract Documents that the Contractor was obliged to recognize pursuant to the terms of the Contract Documents, the Contractor shall assume complete responsibility for such performance and shall bear the full amount of the attributable costs for correction and any damages to Owner, Architect, Construction Manager, or Separate Contractors arising from that work.

§ 3.2.2.1 Contractor acknowledges, 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 the highest and best skill, judgment, and care within the construction industry and applicable to the Work;
- .2 requirements of any warranties applicable to the Work; and
- .3 all laws, ordinances, regulations, rules, and orders which bear upon the Contractor's performance of the Work.

§ 3.2.2.2 The Contract Sum is firm and all inclusive, and no escalation is contemplated for any reason whatsoever. The Contract Sum includes any and all costs associated with substantial and final completion by the dates and times specified, 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.

§ 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 provide notice to the Architect of any legal nonconformity discovered by or made known to the Contractor.

§ 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, the Contractor shall submit Claims as provided in Article 15.

§ 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.

§ 3.3 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 or Construction Manager, shall meet with representative of the Architect or Construction Manager at all times and furnish all information requested; it shall allow the Architect and Construction Manager to inspect the work at all times. Neither the Owner, nor the Architect or Construction Manager 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 or Construction Manager done in good faith and within the scope of their employment by 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 and potential market and delivery conditions and that they provide materials on time. The Contractor is aware of the presence of market volatility and potentiality for significant delivery delays and has assumed the risk of same. 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 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 use best efforts to minimize the likelihood of any strike, work stoppage, or other labor disturbance consistent.

§ 3.3.7 Coordination:

1. 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 Separate 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 attempt to resolve conflicts amongst itself and Separate Contractors and subcontractors.
3. The Owner has hired a CONSTRUCTION MANAGER to provide on-site Project Management services. The Construction Manager and the Architect will share administrative duties, which will be delineated at the Pre-construction conference. The Construction Manager will essentially be the liaison between Owner, Architect, Contractor and Separate Contractors deferring to the Contractor and Separate Contractors for means and methods, deferring to the Architect for final clarifications and determinations of disputes, design issues, and aesthetics and ensuring Owner's voice and interests are represented as the Project proceeds. The Construction Manager, along with the Architect, will manage the following processes – shop drawings, change orders, payments, correspondence, RFI's, construction schedules, documentation, job meetings, quality assurance, punchlists, etc.
4. 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, Construction Manager and Architect who at all times have the right to require the Contractor to replace this Project Manager if their performance is not reasonably satisfactory. The Project Manager shall conduct an onsite meeting at least once a week with the construction superintendent and all Separate Contractors and/or subcontractors in attendance to coordinate the project and review the schedule. The Construction Manager will attend but is not responsible for organizing or taking minutes. The Project Manager shall provide a meeting agenda and issue minutes within four (4) working days of each meeting.
5. The Contractor shall provide a qualified full-time staff member or members to manage the project on site. THIS CONSTRUCTION SUPERINTENDENT and their assistants shall coordinate, organize and manage the project from the Contractor's on-site field office and oversee Contractor's own work and the work of its subcontractors. Should the Contractor be responsible for multiple projects at different sites, multiple locations on one large site or a multiple-site project under one contract then the Contractor shall provide a separate qualified Construction Superintendent for each of the projects or locations. This determination shall be made by Owner, Construction Manager and Architect who at all times may require additional manpower. The Construction 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 and their assistants shall be subject to the approval of the Owner, Construction Manager and Architect, who at all times have the right to require the Contractor to replace this Construction Superintendent and any assistant if their performance is not reasonably satisfactory.
6. Contractor's Subcontractors shall also have a designated superintendent and/or foreman who will at all times be subject to the approval of the Owner, Construction Manager and Architect. The Owner, Construction Manager and Architect reserves the right to require the Contractor to replace the superintendent and/or foreman if their performance is not reasonably satisfactory; Contractor's Subcontractors shall be required to consent to same under the terms of their subcontracts.
7. Each Subcontractor shall coordinate its activities with the activities of Contractor, Separate Contractors and other subcontractors.
8. All questions pertaining to the Work are to be made, via request for information, to the Architect sufficiently in advance of performance to permit Architect time to thoroughly evaluate and investigate the request and provide a written response without delaying the progress of the Work. Contractor shall be responsible for any delay occasioned by the failure to timely submit a request for information based on the standard in this paragraph.
9. The Contractor is required to submit a site logistics plan coordinating all Owner and Construction Manager functions with the access and safety of the job site.
10. The Contractor is required to coordinate all the inspection and material testing to meet the Contract Documents requirements.

11. The Contractor has full and sole responsibility for construction methods and implementation of a "quality control system" to insure coordination.
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. The Contractor shall coordinate the delivery, unloading, movement, relocation, storage and protection of all materials.
14. Accurate dimensions, sleeved and opening drawings are to be submitted by Contractor to Architect prior to placement in the field.
15. The Contractor shall prepare coordination drawings for all above ceiling areas throughout the entire project. Such drawings shall show all piping, duct, cable trays, electrical duct banks, similar items (but not electrical conduit less than 4 inches in diameter), and complete architectural, mechanical and electrical reflected ceiling layouts, (including ductwork, conduits, piping, lighting, etc.).
16. The Contractor is responsible for any omissions of the Subcontractors and is required to provide a complete operating facility.
17. 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; and 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 records of tests and inspections; and coordinate maintenance of record documents;
 - c. Assist the Construction Manager and any of Construction Manager, Architect, or Owner's consultants with final inspections.
 - d. Inform the Owner via the Construction Manager when coordination of Owner's work is required;
 - e. Coordinate all mechanical, plumbing, electrical, food service and equipment/furnishings work, and coordinate that work with all other work.
18. Where space is limited, Contractor shall show plan and cross-section dimensions of space available, including structural obstructions and ceilings as applicable.
19. Contractor shall coordinate cutting and patching activities and sequencing with Separate Contractors and subcontractors.

§ 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 The Architect will evaluate alternatives and substitutions and shall be the sole judge of whether the alternatives and substitutions are acceptable.

- .1 The burden of proving the alternatives and substitutions are equal to or better than 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 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 Construction Manager or Architect for use of such areas is mandatory.

§ 3.4.7 Not later than seven (7) days from the execution of the Agreement, 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 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 shorten or limit the manufacturer's warranties in any way.

§ 3.5.2 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 or supplier's warranty shall be performed in such a manner so as to preserve all rights under such warranties. All such warranties shall commence in accordance with Section 9.8.4, Substantial Completion. The Contractor hereby assigns to the Owner, effective upon the earlier of termination of this contract or substantial completion, all manufacturer 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 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 or supplier's refusal to honor such warranty. The Contractor's obligations under this Section 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 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.

§ 3.7.1.1 The required Building Permit or Permits shall be secured by the Contractor for the entire project. This shall include permits required for the Construction Manager's Trailer.

§ 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 In addition to any other obligation under similar provisions of the Contract Documents, 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 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 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 shall direct any necessary re-design of the Work. As set forth in Article 1, Contractor accepts the risk of concealed or unknown conditions.

§3.7.4.1 If it shall be determined by a court of competent jurisdiction that Contractor cannot bear the full risk of concealed or unknown conditions as a matter of law, adjustment in the Contract Time or Contract Sum shall be permitted only for conditions that differ materially from those conditions specifically disclosed by Owner, Architect, or Construction Manager or unusual and adverse conditions actually known to Owner, Architect, or Construction Manager that should have reasonably been disclosed to Contractor.

§ 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. 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.

§ 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 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and all required taxes, less applicable trade discounts;
- .2** whenever costs of materials and equipment 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 the difference between actual costs of material and equipment and the allowances under Section 3.8.2.1, but shall not reflect changes in the costs for unloading and handling at the site, labor, or installation costs.

§ 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 Construction Superintendent shall represent the Contractor, and communications given to the Construction 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 Construction 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 Construction 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 Construction Superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the Construction Superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule 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 an explanation for the cause of the schedule slippage and 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 The Owner's failure to direct Extraordinary Measures shall in no event excuse Contractor's failure to maintain the schedule or timely reach substantial or final completion of the Work.

§ 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, (ii) Contractor was on schedule to timely reach substantial and final completion of the Work; and (iii) 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 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, 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 the execution of the Agreement 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 its 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, Architect or Construction Manager 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 and Construction Manager 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, Construction Manager or Architect 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 Separate 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 manufacturer's 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 ensure 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, Construction Manager and Architect with access to the Work in preparation and progress wherever located.

§ 3.16.1 The Contractor shall promptly notify the Architect, Construction Manager 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 ingress to, egress from and mobility around construction areas.

§ 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 Construction Manager 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 defend, indemnify and hold harmless the Owner, Architect, Construction Manager, and other consultants or professionals retained by Owner and their respective officers, employees, owners, volunteers and agents ("Indemnitees"), from and against all claims, damages, losses, and expenses, including reasonable attorney's fees and costs, in case it shall be necessary to file an action or claim or in case an action or claim is brought or made which is; 1) for personal or bodily injury, illness or death, for property damage, including loss of use, or for any economic loss and; 2) caused in whole or in part by Contractor's alleged negligent acts or omissions, breaches of contract, or otherwise arising out of their work, or those of a Subcontractor, or that of anyone employed by them, or for whose acts Contractor or Subcontractor may be liable. Contractor's obligation hereunder shall apply in all instances whether the Indemnitees are made a party to the action or claim or are subsequently made a party to the action by third-party in-pleading or are 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. Contractor's obligation hereunder shall apply even when such claims, damages, losses and expenses are caused in part by the Indemnitees. 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 shall defend, indemnify and hold harmless the Indemnitees against all fines, penalties or losses, including reasonable attorney's fees and costs, incurred as a result of violations by Contractor of any statute, ordinance, regulation, rule of law of any political subdivision or duly constituted public authority.

§ 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.

§ 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 assumes all risks and bears any costs and expenses occasioned by neglect or accident during the progress of the Work until, at earliest, same shall have been completed and accepted by the Owner. 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.

§ 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.

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

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

§ 4.2.6 The Architect and Construction Manager have authority to reject Work that does not conform to the Contract Documents. Whenever the Architect and Construction Manager considers it necessary or advisable, the Architect and Construction Manager will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect or Construction Manager 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 or Construction Manager 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 or Construction Manager will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect or Construction Manager will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect and Construction Manager 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 INTENTIONALLY OMITTED

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

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings.

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site or provide material or equipment directly to the Contractor. 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 Identification of Subcontractors required by N.J.S.A. 18A:18A-18 shall be provided with the bid 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 the Contract Documents. Approval of the submittals required under the Article shall not relieve the Contractor from conformance to the Contract Documents.

§ 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 proposed persons. If adequate data on any proposed Subcontractor or manufacturer 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 materials and work furnished by the listed Subcontractor or manufacturer must conform to such requirements.

§ 5.2.3 INTENTIONALLY OMITTED

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected, or decide to self-perform such Work, if the Owner or Architect makes reasonable objection to such substitution or self-performance, including on the grounds that Contractor is attempting to improve its profits on the project without commensurate benefit to the Owner.

§ 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 Jersey 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 Subcontractor to comply with the Public Works Contractor Registration Act, N.J.S.A. 34:11-56.48 et seq.

§ 5.4 INTENTIONALLY OMITTED

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

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

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

§ 6.1.3 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, Construction Manager and the Construction schedule – to complete the work as required by the Owner. The Construction Manager will provide assistance to the Contractor for coordination between their work and the Owner.

§ 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 and Construction Manager 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 Separate Contractor on the Project by reason of such Separate 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.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor 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 to the site or adjoining property.

§ 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 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 directive, order, field directive or field order shall not be recognized as constituting a change in the Work or the Contract Documents or 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, Architect and Construction Manager its change proposal for 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 proposal does not provide an additional time request, the Contractor shall not be entitled to an extension of time. The Contractor shall furnish spreadsheets from which the breakdowns were prepared, plus spreadsheets 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 its proposal.

§ 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 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. 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, 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.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect or Construction Manager and signed by the Owner, Contractor, Construction Manager 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% combined and shall not include markups below the Subcontractor level.

§ 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 increase or reduction in overhead and profit (15% maximum combined) 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 change.

§ 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 a Change Order of less than \$100,000.

§ 7.2.9 All Change Orders will be consistent with N.J.A.C. 6A:23A-21.1 and N.J.A.C. 6A:26-4.9.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect or Construction Manager 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 Section 7.2. In such case, and also under Section 7.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data, including such supporting and itemized data from Subcontractors. 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;
- .2 Costs of materials, supplies, and equipment, 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 and without any compensation for Contractor or Subcontractor-owned machinery or equipment;
- .4 Costs of premiums for all bonds and insurance shall be limited to 1.5%, and must be directly related to the change; and
- .5 Costs of home office, supervision and field office personnel, whether directly or indirectly attributable to the change, WILL NOT BE PERMITTED UNDER ANY CIRCUMSTANCE.

§ 7.3.5 INTENTIONALLY OMITTED

§ 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 plus the 15% combined overhead and profit as confirmed by the Architect or Construction Manager. When both additions and credits covering related Work or substitutions are involved in a change, the increase or decrease for overhead and profit shall be figured on the basis of net change 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 or Construction Manager will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect or Construction Manager determines, in the Architect or Construction Manager's professional judgment, to be reasonably justified. The Architect or Construction Manager'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 or Construction Manager 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 or Construction Manager 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 and/or the Construction Manager 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 and/or the Construction Manager's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and Construction Manager 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 and/or Construction Manager's order for a minor change without prior notice to the Architect and Construction Manager 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 Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.3 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, 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 Construction Manager, 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 Construction Manager, will be performed at no additional cost to the Owner.

§ 8.2.5 Absent direction of the Owner to the contrary, Work 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 difficult to ascertain.

§ 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) negligence, bad faith, activate interference or tortious conduct of the Owner; (2) changes ordered in the Work; or (3) other occurrences, despite Contractor's best avoidance and mitigation efforts, beyond the control and without the fault or negligence of the Contractor and as to which the Contractor has not accepted the risk elsewhere in the Contract Documents, 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 or as to which Contractor has accepted the risk elsewhere in the Contract Documents 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 whether or not an extension of time may be available to Contractor.

§ 8.3.2 Any claim for extension of time shall be made in writing to the Architect not more than five (5) days after the delay commences or Contractor reasonably should know a delay is likely, whichever is earlier, 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, subject to the limitations of N.J.S.A. 18A:18A-41. 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 that expressly permit same.

§ 8.3.4 The Contractor agrees that the Owner can deduct from the Contract Sum, or shall be entitled to reimbursement for, any wages or fees paid or to be paid by the Owner to any inspectors, the Architect and the Construction Manager employed by it on the Project for any number of days in excess of what would have been required had the Work timely been substantially and finally completed and that such wages and fees are determinable damages not factored into the liquidated damages set forth in the Agreement.

§ 8.3.5 Contractor accepts the risk of interruptions and delays in the Work from typical weather conditions. 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 to require a consideration of the five previous years of data at the location of the Project for the month in which the weather delay is claimed. Weather is unusually severe if the number of days in which weather conditions preclude the performance of the Work during the month in question exceed the average shown in the historical data for the month in question; the extension of time shall be limited to the number of days in excess of the average.

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 INTENTIONALLY OMITTED

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum, 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, Construction Manager 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.

§ 9.2.1 In addition to other elements of the Work, Contractor shall include the following separate items in its 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, including Contractor's, Subcontractors, and Sub-subcontractors, shall be submitted as well as other such data for the purposes of summarizing the Work and tracking the Project. The Architect and the Construction Manager will process the application and forward it with his recommendations to the Owner

§ 9.3.1.1 INTENTIONALLY OMITTED

§ 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 Upon final completion, 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 Substantial Completion.

§ 9.3.1.4 Upon final 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 all obligations of the Contract Documents has been satisfactorily completed and no claims for which Contractor may have responsibility are pending or anticipated.

§ 9.3.1.5 In addition to requirements set forth elsewhere in the Contract Documents, applications for payment shall be accompanied by the following, all in form and substance satisfactory to the Owner, Architect and Construction Manager:

1. A current Contractor's lien and claim waiver and a 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 Subcontractor's lien and claim waiver for each Subcontractor identified in the statement referenced in the preceding paragraph.
3. A Purchase Order or Voucher if required by the Owner.
4. A Schedule Update approved by the Construction Manager and Architect.
5. A Third Party (not the General Contractor) written Field Safety Inspection Report.
6. An updated Shop Drawing Log showing the status of all of the required Shop Drawings.

§ 9.3.2 Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with Sections 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. The Contractor shall store the off-site materials and equipment in a secure, bonded warehouse.

§ 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 Owner, Architect and Construction Manager 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.

§ 9.3.4 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.

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 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 Fourteen days after receipt of the Contractor's Application for Payment, either (1) issue to the Construction Manager a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Construction Manager 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, Owner and Construction Manager of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

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

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect or Construction Manager 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 repeated failure to carry out the Work in accordance with the Contract Documents;
- .7 avoidable delay in the progress of the Work;
- .8 delay in the submission for approval of the names of Subcontractors, materialmen, sources of supply, shop drawings, samples, or other submittals;
- .9 failure to maintain the Project Site in a clean, safe and satisfactory condition in accordance with good construction practices as recommended by the Architect after consultation with the Contractor and Construction Manager;
- .10 failure to submit updates as required by the Owner or as required by the Contract Documents;
- .11 failure of the Contractor 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;
- .12 failure of Contractor to provide a third-party Insurance Safety Site Inspection Report monthly and remedy all issues promptly;
- .13 reasonable evidence that a legal impediment has arisen or can reasonably be expected to arise that would preclude the Contractor from completing the Work, timely or otherwise; or
- .14 Failure to cooperate with Owner, Construction Manager or Architect relative to construction schedule, material storage, coordination with the Owner, clean up or safety.

§ 9.5.2 INTENTIONALLY OMITTED

§ 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 or Construction Manager 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 Construction Manager 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 The Contractor agrees that the time and conditions for payment under the Contract shall be as stated 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;
 - .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 Documents, or require the Owner to make a payment in advance of the time, or in an amount greater than, as provided by Contract Documents; or
 - .3 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. 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.
- .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. 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 Section 9.5.1. 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 If a Subcontractor has performed in accordance with the provisions of its Contract with the Contractor and the Work has been accepted by the Owner, the Owner's authorized approving agent, or the contractor, as applicable, and the parties have not otherwise agreed in writing, the Contractor shall pay to its Subcontractor within 10 calendar days of the receipt of payment from the Owner, the full 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 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.

§ 9.6.8 INTENTIONALLY OMITTED

§ 9.7 Failure of Payment

If the Owner does not pay the Contractor as required by "the Prompt Payment Act"; does not provide a written statement of the amount withheld and the reason for the withholding; and the Owner is not engaged in a good faith effort to resolve the reason for the withholding, then the Contractor may, upon seven calendar days' written notice to the Owner, stop the Work, without penalty for breach of contract, until payment of the amount owing has been received. The Contract Time shall be extended appropriately.

§ 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 require 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 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":

- .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 "Final Acceptance" and the start of the warranty period. (These reports must be submitted in accordance with the shop drawing process to the Architect 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 the Architect 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, Construction Manager 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 Construction Manager and Architect. The Contractor's Project Manager shall take the lead and conduct an onsite review with the Contractor's superintendent and representation from every Prime Subcontractor. Notification of this onsite walk thru shall be provided in writing to Construction Manager, Architect and Owner 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 Construction Manager and Architect 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.

§ 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 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 and Maintenance Bond 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, (6) as-built drawings, and (7) 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 Construction Manager of Contractor's General Warranty (as described in Paragraph 3.5) and each written warranty and assignment thereof prepared in duplicate, certificates of inspections, and bonds for the Construction Manager's review and delivery to Owner, (d) delivery to the Construction Manager 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 Construction Manager of specified Project record documents, (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 (g) delivery to the Owner of the Maintenance Bond. 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 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.

§ 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.

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 costs associated with complying with all safety requirements shall be included in the 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 and/or the Construction Manager are not responsible for safety on this project but will endeavor to promote safety. Contractor must comply with job Safety Requirements in addition to OSHA and local agency requirements. Failure to comply with safety requirements will be grounds for withholding of payments.
- .3 Contractor will comply with all reasonable requests of the Owner and Construction Manager 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.
 - .1 The Contractor shall provide, maintain, relocate and remove in coordination the Construction Manager, a 6' high, perimeter security fence. Fence will surround the building or relevant portions thereof 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.
 - .2 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.
 - .3 This is a hard hat job. Identifying hard hats shall be worn at all times.
 - .4 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 Construction Manager. Contractor shall provide wall hung fire extinguishers throughout building as deemed necessary by the Construction Manager 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 Construction Manager 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 OSHA or Authority having local jurisdiction.
- .10 The Contractor shall submit to the Construction Manager, 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. The Contractor shall provide for fire separation walls between occupied areas as required by local officials.
- .16 The Contractor shall provide, relocate and /or maintain barricades, signage, provide flagmen etc. as necessary to ensure public safety and safe egress.
- .17 The Contractor shall notify the Construction Manager immediately upon arrival of OSHA inspector/representative to the site.
- .18 The Contractor shall submit to the Construction Manager 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 New Jersey law regarding the use or storage of hazardous substances in Schools. MSDS sheets shall be posted prior to product being delivered to site.
- .19 The Contractor, Subcontractors, vendors, etc. must enforce a no smoking, vaping or alcohol use policy for all employees during the entire course of the project. Any worker found violating these restrictions, or being belligerent, will be subject to removal from the site at the sole discretion of Owner.
- .20 The Contractor shall be responsible to secure the site at the end of each workday by an effective means and maintain same until all parties determine same is no longer required.
- .21 For the safety of occupants, staff, and the public, the steel erection must be scheduled and coordinated with the Construction Manager. Swinging of steel and crane boom over occupied space will not be allowed. Steel Subcontractor shall provide additional barricades and fencing around his crane and steel at all times.
- .22 The Contractor must submit an acceptable OSHA compliant site specific written safety plan to the Construction Manager prior to mobilizing on site. The written safety plan shall include (as applicable to their work) but is not limited to the following:

- No smoking, vaping or alcohol use is allowed on the project, including while away from the site if the worker will go to or return to the site that day. 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.
 - 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 The 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.
- .25 The speed limit within the project property is 5 MPH. 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.

§ 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 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 directly to grossly negligent acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 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.

§ 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 Construction Manager 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 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.

§ 10.2.14 The Contractor shall promptly report in writing to the Owner, Construction Manager 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, Construction Manager and Architect.

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

- .1 Anyone found impaired 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, Construction Manager 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, Construction Manager 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, Construction Manager 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, Construction Manager or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor Construction Manager 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 INTENTIONALLY OMITTED

§ 10.3.4 INTENTIONALLY OMITTED

§ 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 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 Construction Manager 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 the 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.

§11.1.1.1 Construction Manager shall be included as additional insured in all places where Architect is named. 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 the Agreement and prior to any personnel or equipment being brought onto and/or before any work commences at the job site. The coverage afforded under any insurance obtained pursuant to this paragraph shall be primary to any valid and collectible insurance carried separately by any of the indemnities. Such certificates shall provide that there shall be no cancellation, non-renewal or material change of such coverage without thirty (30) days prior written notice to Owner. In the event of any failure by Contractor to comply with the provisions of this Article 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 on twenty-four hour's notice 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, Construction Manager, Architect, other Indemnitees referenced in Section 3.18, the State of New Jersey and the New Jersey Department of Education shall be named as 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

.1	Commercial General Liability, Each Occurrence	
a.	Each Occurrence:	\$ 1,000,000.00
b.	Damage to Rented Premises:	\$ 300,000.00
c.	Medical Expense (Any one person):	\$ 15,000.00
d.	Personal & Adv Injury:	\$ 1,000,000.00
e.	General Aggregate:	\$ 3,000,000.00
f.	Products – Comp/Op Agg:	\$ 3,000,000.00

- .2 Automobile Liability: (Hired autos, scheduled autos, non-owned autos)
 - a. Combined Single Limit (each accident): \$ 1,000,000.00
- .3 Workers Compensation and Employers Liability:
 - a. WC Statutory Limits:
 1. E.L. Each Accident: \$ 1,000,000.00
 2. E.L. Disease – Each Employee: \$ 1,000,000.00
 3. E.L. Disease – Policy Limit: \$ 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 in the Contract Documents in an amount equal to the Total Project Value, excepting excavations, foundations and other structures customarily excluded by such insurance. 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. In addition to the other additional named insured requirements set forth in this Article 11, the policy is also to include all contractors, subcontractors and sub-subcontractors 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, notwithstanding the cause of the loss.
- .5 Contractual liability insurance applicable to the Contractor's obligations under Section 3.18.
- .6 Workers' Compensation Insurance of not less than statutory limits.
- .7 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.
- .8 Certificates of insurance must be submitted on the ACORD Form, Certificate of Insurance. The Contractor's ACORD Certificate of Insurance must state "Contractual Liability Included" or it will be rejected.
- .9 The Contractor shall either
 - .1 require each of its 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 and Payment Bond in the form required by the Contract Documents, without limitation complying with the following specific requirements:

- .1 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 Substantial Completion or the time required to resolve any items of incomplete or inadequate work and the payment of any disputed amounts, whichever time period is longer;
- .2 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;
- .3 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. 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, Construction Manager and Architect.

§ 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 or the policies themselves required under Paragraph 11.1 or to demand receipt of such certificates or policies 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 or the policies themselves.

§ 11.1.8 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.

§ 11.1.9 The Contractor shall cause each Subcontractor to (1) procure insurance in the amounts set for in Article 11 and (2) name the persons referenced in Section 11.1.1.1 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.

§ 11.1.10 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.

§ 11.1.11 The Contractor may carry whatever additional insurance he deems necessary to protect itself 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, staging, towers and forms owned or rented by the Contractor, the capital value of which is not included in the cost of the Work.

§ 11.1.12 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.

§ 11.1.13 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.

§ 11.1.14 The Contractor and Subcontractors 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 INTENTIONALLY OMITTED

§ 11.4 INTENTIONALLY OMITTED

§11.5 INTENTIONALLY OMITTED

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 two 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. 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 Section 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 Section 12.2., the two-year correction period in connection with the work requiring correction shall be renewed and recommenced.

§ 12.2.2.2 The 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.

§ 12.2.3 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 period for

correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct Work which found to be defective or otherwise warranted within the two-year period, 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, Construction Manager 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 governing law shall be the law of the State of New Jersey without respect to the conflict of law principles thereof. The parties consent to exclusive jurisdiction in the Superior Court of New Jersey venued in Salem County, New Jersey, unless claims fall under exclusive jurisdiction of federal courts and such claims shall be brought in the District Court of New Jersey, Camden Division.

§ 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. 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 INTENTIONALLY OMITTED

§ 13.3 Rights and Remedies

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

§ 13.3.2 No action or failure to act by the Owner, Construction Manager, 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 manpower 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 and Construction Manager timely notice of when and where tests and inspections are to be made so that the Architect

and Construction Manager 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 Construction Manager, Architect, Owner and Contractor shall be afforded a reasonable opportunity to attend, observe, and witness all inspections and tests of the Work. The Construction Manager, 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.

§ 13.4.2 If the Architect, Owner, Construction Manager 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 and Construction Manager 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 Construction Manager and 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 and Construction Manager.

§ 13.4.5 If the Architect or Construction Manager is to observe tests, inspections, or approvals required by the Contract Documents, the Architect and Construction Manager 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

§ 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 Payments withheld for time delays, faulty materials, workmanship, or other failure to follow the Contract Documents shall not bear interest.

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 only if the Project has been delayed in aggregate more than 100% of the total number of days scheduled for completion as a result of any combination of the following:

- .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, without cause, has not made payment on a Certificate for Payment within the time stated in the Contract Documents.

§ 14.1.2 If the requirements of Section 14.1.1 are met, the Contractor may, upon fourteen (14) days written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment on the same basis as if Owner had terminated the Contract for convenience.

§ 14.1.3 If the Work is stopped for a period of 120 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 14.1.2.

§ 14.1.4 INTENTIONALLY OMITTED

§ 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 repeatedly fails to make prompt payment to Subcontractors or suppliers as required by the Contract Documents;
- .3 disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority;
- .4 is otherwise is guilty of substantial breach of a provision of the Contract Documents or disregards significant 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 repeatedly fails to maintain site cleanliness or site safety;
- .10 engages in any acts or omissions specifically identified as providing a basis for termination elsewhere in the Contract Documents; or
- .11 repeatedly fails to meet any other obligation of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor. The provision of notice hereunder does not provide the Contractor an opportunity to cure. If Owner terminates under this Section, it 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; and
- .2 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

§ 14.2.4 If the costs of finishing the Work, including compensation for the services of any consultants and the Architect and Construction Manager'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, the payment of replacement contractors, 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 INTENTIONALLY OMITTED

§ 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 Payment for the Owner's termination for convenience shall be as set forth in the Agreement. 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 Section 14.2 and it is subsequently determined that the Owner was not authorized or permitted to terminate the Contract as provided in Section 14.2, the Owner's termination shall be treated as a termination for convenience under this Section 14.4 and the rights and obligations of the parties shall be the same as if the Owner had issued a notice of termination to the Contractor under Section 14.4 rather than Section 14.2.

§ 14.5 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.

§ 14.6 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 requirements

of and within the period specified by applicable law. 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, Construction Manager 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 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, and the provision shall be interpreted to the greatest extent possible in favor of the Owner.

§ 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.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 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.

§ 15.1.3.3 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 including through litigation, 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 resolution of the claim.

§ 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 herein shall be given to the Owner, Construction Manager 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 Construct 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 8.3.2 shall be given. Said notice shall itemize all claims and shall contain sufficient detail and substantiating data to permit evaluation of same by Owner, Architect and Construction Manager. No such claim shall be valid unless so made. The Contractor's Claim shall include an estimate of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 INTENTIONALLY OMITTED

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor waive Claims against Owner for consequential damages arising out of or relating to this Contract. This waiver includes, but is not limited to, 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 waiver is applicable, without limitation, to all consequential damages due to Owner'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 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 litigation. 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 file litigation unless mediation is specifically required by the Contract Documents. 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.

SECTION 01010 - SUMMARY OF WORK

1.1 GENERAL

- A. The Project consists of New Field House at Arthur P. Schalick High School, 718 Centerton Road, Pittsgrove, New Jersey 08318.
- B. Owner: Pittsgrove Township Board of Education, 1076 Almond Road, Pittsgrove, New Jersey 08318.
- C. Contract Documents were prepared for the Project by Garrison Architects, 713 Creek Road, Bellmawr, NJ 08031
- D. The Work includes but is not limited to the following: (see the construction documents for details):
 - 1. The Owner hired Epic Environmental Services, LLC to perform an environmental survey of the areas impacted by construction activities. Epic has informed us that they did not identify any asbestos in the areas impacted by construction. The reports can be reviewed upon request.
 - 2. The Contractors are strongly encouraged to verify all existing condition, dimensions and areas prior to submitting a responsive / responsible bid. Site visits can be arranged through the Facility Director, Jason Mills, email: jmills@pittsgrove.net, cell: (856) 491-1917.
 - 3. Contractors are strongly encouraged to visit the site of the Project before submitting costs for the project. 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.
 - 4. The Contractor shall provide a full-time onsite Superintendent who will be present for all work at all times including, but not limited to, subcontractor work. The Superintendent will be responsible for maintaining a daily log of all personnel onsite at each job site and all of the other on-site responsibilities outlined in the Specifications.
 - 5. The Contractor is to provide a list to the Construction Manager with the names of all personnel on site, each day, and no later than two hours after the work has commenced or by 9:00 AM every day via email.
 - 6. During the complete duration of the Work, the Contractor must maintain the continued operation and function of all services and systems including, but not limited to, fire alarm, data, network, information technology, security, audio visual, public address, electrical and HVAC. If a disruption to a system occurs, the Contractor must immediately take all actions necessary to restore the system at the earliest possible time. Any required shutdown of any system needs to be coordinated and scheduled with the Owner at times when school is not in session.
 - 7. 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.
 - 8. LOOSE FURNITURE, EQUIPMNET AND PERSONAL ITEMS: Unless noted otherwise, Owner shall be responsible to remove loose furniture, equipment and personal items from areas of work as needed to facilitate scheduled renovations. The Owner will work expediently to prioritize specific areas with the Contractor

SECTION 01010 - SUMMARY OF WORK

- but may take up to five (5) calendar days after the last day of school to remove all items completely.
9. Dispose of material according to state and local code and Section 01524 – Construction Waste Management.
 10. Field verify existing conditions, exact dimensions of existing rooms and openings, etc. The dimensions shown on the bidding documents are approximate and provided for preliminary reference only.
 11. Record all necessary existing conditions, adjust exact materials and methods as required and submit via shop drawings for Architect's review within 45 days of Notice of Award.
 12. Provide final clean up in each room to include removal of all debris, dust, dirt and stains on all affected walls, floors and other surfaces on a daily basis. Glass or other dangerous items will not be tolerated if left at a completed area.
 13. Utilities must remain in service at all times when school is in session. The Contractor will be responsible for all resulting costs should they fail to comply with this requirement.
 14. Restore all grades, lawns, concrete curbing, sidewalks, asphalt, and pavement to pre-construction condition.
 15. 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.
 16. The Scope of Work shall include the following:

NEW FIELDHOUSE AT ARTHUR P. SCHALICK HIGH SCHOOL:

- a. The work includes all site, general construction, mechanical, plumbing and electrical work for the construction of a new fieldhouse. The building shall be a pole barn wood frame construction with wood posts & trusses, galv. steel metal panel walls and roof assemblies, FRP doors in aluminum frames with ADA hardware, and fixed/projected aluminum frame windows. Gang toilet room finishes shall be epoxy floors with integral epoxy base, steel studs with FRP finish at wet walls and impact resistant gypsum board wall and ceiling finishes. The Team Room will have sealed concrete floors with vinyl base. Site work including paving, grading and trenching for utilities is included as required to support the new building. Refer to the Drawings and Specifications for a complete scope of work.
- b. **Alternate Bid #1** shall be to provide a brick masonry veneer wainscot at the building perimeter as shown on the elevation and section drawings. Refer to the Drawings and Specifications for a complete scope of work.
- c. **Alternate Bid #2** shall be to provide a single use toilet room within the team room. Finishes include an epoxy floor with integral epoxy base and suspended acoustical tile ceiling. Refer to the Drawings and Specifications for a complete scope of work.
- d. **Alternate Bid #3** shall be to connect the new duplex sanitary pump system to the existing emergency generator as shown on the electrical drawings.

E. 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. **The project completion date is March 7, 2026.**

SECTION 01010 - SUMMARY OF WORK

2. 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.
 3. All tie-in work to integrate into the existing building's systems shall be completed during Second Shift hours, weekends, holidays or Summer of 2025. Class hours on each school day are from 7:00 A.M. to 3:30 P.M. unless noted otherwise on the school calendar as a half day (hours may vary per school building). No activities generating excessive or unreasonable noise and/or vibrations will be permitted during school hours. The Owner reserves the right to stop disruptive activities at any time during Class hours.
- F. The Work will be constructed under one lump sum prime contract.
- G. 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.
- H. 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.**
- I. 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. 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 Owner 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.

SECTION 01010 - SUMMARY OF WORK

3. Allow for Owner occupancy and use by the public. Provide construction fencing and non-combustible safety barriers for students, faculty and the public.
 4. 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.
 5. All oversized deliveries must be scheduled in coordination with the Owner / Construction Manager. Site limitations during school hours restrict maneuvering of oversized (tractor trailer) vehicles.
 6. 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.
 7. 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 of the school will be the sole judge of what is appropriate or inappropriate. Anyone not conforming to this requirement will be immediately removed from the building. **This is a zero tolerance policy.**
 8. Verbal and visual comments to the school staff, students or anyone other than by the Construction Manager will not be tolerated and will be cause for removal from the site. **This is a zero tolerance policy.**
 9. The use of drugs, cannabis, tobacco or alcohol anywhere on the grounds or in the building will not be permitted and will be cause for removal from the site.
 10. The use of radios will not be permitted at any time.
 11. Powder actuated fasteners will not be permitted without prior authorization by the Construction Manager when school is not in session.
- J. Provide temporary construction fencing to completely encompass areas that would be disturbed during construction, including areas where material will be stored. The fencing must completely surround all construction areas and material storage areas. Provide, "NO TRESPASSING" signs on all construction fencing at intervals of 40 feet on center or closer.
- K. Perform weekly mowing, weed whacking, cleaning and maintenance inside all construction staging areas until the fencing is removed.
- 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 partially occupy the buildings during the summer for summer programs.
- N. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion. Placing equipment and partial occupancy do not constitute acceptance of the Work.

SECTION 01010 - SUMMARY OF WORK

1. The Architect will prepare a Certificate of Substantial Completion after the Contractor obtains a Certificate of Occupancy from Building Officials for each portion of Work occupied prior to Owner occupancy.
 2. Mechanical and Electrical systems shall be operational and required inspections and tests completed prior to partial Owner occupancy. Upon occupancy, the Owner will operate and maintain systems serving occupied portions of the building.
 3. The Owner will be responsible for maintenance and custodial service for occupied portions of the building.
- O. Owner – Furnished Products: The Owner may furnish some products for the contractor to install including (but not limited to) toilet accessories. The Work includes providing support systems to receive Owner's equipment, and mechanical and electrical connections.
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 its operations.
- P. 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.
- Q. **SAFETY:** The Contractor is responsible for providing and enforcing 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. For further Contractor responsibilities with respect to safety, refer to article 10 of the General Conditions of the Contract for Construction.
- R. The Contractor shall not use any product containing asbestos and all plumbing **shall** be 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".
- S. **The Contractor is required to have all long lead items in fabrication and provide proof from the manufacturer within (45) days of the award of the contract. The** Owner will pay for stored material in accordance with the General Conditions. Delays

SECTION 01010 - SUMMARY OF WORK

caused by the failure of the Contractor to adhere to this requirement will not be cause for a time extension.

1. Supply Chain Shortages: Due to the ongoing supply chain shortages, the Contractor will be required to do the following:
 - a. Once a purchase order has been issued or the Contract has been signed, the Contractor shall order ALL materials ASAP.
 - b. The materials must be stored in a secured location, out of the weather and within acceptable storage temperatures. The cost of this material handling is to be included in the project cost.

END OF SECTION 01010

Pittsgrove Township School District Calendar 2024-2025



September 18 Days						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

October 22 Days						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

November 17 Days						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

December 15 Days						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

January 19 Days						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

September 2		Labor Day
September 3-4		Staff Professional Development
September 5		First Day for Students
October 11		Early Dismissal~Students Staff 1/2 Prof
October 14		Columbus Day/ Indigenous Peoples Day
November 7-8		NJEA Convention
November 11		Veterans Day Activities
November 27		Early Dismissal-Students
November 28-29		Thanksgiving Break
December 20		Early Dismissal
December 23-January 1		Winter Break
January 20		Martin Luther King Jr. Day
January 27		County Staff Professional Development
February 14		Early Dismissal~Students Staff 1/2 Prof
February 17		Presidents' Day Weekend
March 7		Staff Professional Development Day
April 16		Early Dismissal - Students
April 17, 18, 21, 22		Spring Recess
May 2		Staff Professional Development Day
May 26		Memorial Day Observed
June 13, 16		Early Dismissal~Students Staff 1/2 Prof.
June 17		Last day of School
June 20		Juneteenth Observed

KEY

	SCHOOL CLOSED
	EARLY DISMISSAL STUDENTS
	STAFF PROFESSIONAL DEVELOPMENT DAY
	EARLY DISMISSAL STUDENTS STAFF PROFESSIONAL
	WEATHER CLOSING JAN. 6

February 19 Days						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

March 20 Days						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

April 18 Days						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

May 20 Days						
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

June 12 Days						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

PARENTS & STAFF: Due to the recent weather closing on January 6, 2025 our district students will now have an early dismissal on February 14, 2025 with afternoon staff professional development. In the event the district has an additional weather closing, May 2, 2025 will be a student early dismissal with staff afternoon professional development. If further make-up days are required, they will be added to the end of the school year in June. It is recommended that you do not schedule vacations to begin prior to June 30, 2025, or anytime during the school year. You will be notified of the district calendar changes as they occur.

P. I. E.

Pittsgrove Township School District Calendar 2025-2026



September 19 Days

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

October 22 Days

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

November 16 Days

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

December 17 Days

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

January 19 Days

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

February 18 Days

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

March 21 Days

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

April 16 Days

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

May 19 Days

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

June 18/13 Days

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

- September 1 Labor Day
- September 2-3 Staff Professional Development
- September 4 First Day for Students
- October 13 Staff Professional Development
- November 6&7 NJEA Convention
- November 26 Early Dismissal-Students
- November 27-28 Thanksgiving Break
- December 23 Early Dismissal
- December 24-January 2 Winter Break
- January 19 Martin Luther King Jr. Day
- February 13 Staff Professional Development
- February 16 Presidents Day
- March 6 County Wide Staff Professional Development
- April 3-10 Spring Recess
- May 22 & 25 Memorial Day Weekend
- June 23,24,25 Early Dismissal -Students
- June 25 Last Day of School

KEY

	SCHOOL CLOSED
	EARLY DISMISSAL
	STAFF PROFESSIONAL DEVELOPMENT DAY
	EARLY DISMISSAL STUDENTS STAFF PROFESSIONAL DEVELOPMENT
	LAST DAY OF SCHOOL 1/2 DAY

PARENTS & STAFF: This calendar includes five designated weather days. If these days are not used, they will be subtracted from the school calendar. If all five built in snow days are used, the district will deduct days from the spring break in reverse order beginning with Friday April 10th. It is advised not to plan vacations before June 30, 2026, or during the school year. Any changes to the district calendar will be communicated to you as they arise.

P. I. E.

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 to the Construction Manager 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 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 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 Contractor shall submit 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 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 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.
 - g. Security System.
 - h. Computer System.
 - i. Telephone and Cable TV System.

SECTION 01045 - CUTTING AND PATCHING

- 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.
- 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 that visually match adjacent surfaces to the fullest extent possible. 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.
- 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.

SECTION 01045 - CUTTING AND PATCHING

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 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 by the Owner 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 abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
1. AABC - Associated Air Balance Council; www.aabc.com.
 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 7. ABMA - American Boiler Manufacturers Association; www.abma.com.
 8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
 9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 11. AF&PA - American Forest & Paper Association; www.afandpa.org.
 12. AGA - American Gas Association; www.aga.org.
 13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
 14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
 15. AI - Asphalt Institute; www.asphaltinstitute.org.
 16. AIA - American Institute of Architects (The); www.aia.org.
 17. AISC - American Institute of Steel Construction; www.aisc.org.
 18. AISI - American Iron and Steel Institute; www.steel.org.
 19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
 20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
 21. ANSI - American National Standards Institute; www.ansi.org.
 22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
 23. APA - APA - The Engineered Wood Association; www.apawood.org.
 24. APA - Architectural Precast Association; www.archprecast.org.
 25. API - American Petroleum Institute; www.api.org.
 26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
 27. ARI - American Refrigeration Institute; (See AHRI).
 28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
 29. ASCE - American Society of Civil Engineers; www.asce.org.

SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWWPA - American Wood Protection Association; www.awpa.com.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc.; www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
49. CDA - Copper Development Association; www.copper.org.
50. CE - Conformite Europeenne; <http://ec.europa.eu/growth/single-market/ce-marking/>.
51. CEA - Canadian Electricity Association; www.electricity.ca.
52. CEA - Consumer Electronics Association; www.ce.org.
53. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CPA - Composite Panel Association; www.pbmdf.com.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - CSA Group; www.csagroup.com.
65. CSA - CSA International; www.csa-international.org.
66. CSI - Construction Specifications Institute (The); www.csinet.org.
67. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
69. CWC - Composite Wood Council; (See CPA).
70. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
71. DHI - Door and Hardware Institute; www.dhi.org.
72. ECA - Electronic Components Association; (See ECIA).
73. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).

SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

74. ECIA - Electronic Components Industry Association; www.eciaonline.org.
75. EIA - Electronic Industries Alliance; (See TIA).
76. EIMA - EIFS Industry Members Association; www.eima.com.
77. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
78. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
79. ESTA - Entertainment Services and Technology Association; (See PLASA).
80. ETL - Intertek (See Intertek); www.intertek.com.
81. EVO - Efficiency Valuation Organization; www.evo-world.org.
82. FCI - Fluid Controls Institute; www.fluidcontrolsintstitute.org.
83. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
84. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
85. FM Approvals - FM Approvals LLC; www.fmglobal.com.
86. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
87. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarooft.com.
88. FSA - Fluid Sealing Association; www.fluidsealing.com.
89. FSC - Forest Stewardship Council U.S.; www.fscus.org.
90. GA - Gypsum Association; www.gypsum.org.
91. GANA - Glass Association of North America; www.glasswebsite.com.
92. GS - Green Seal; www.greenseal.org.
93. HI - Hydraulic Institute; www.pumps.org.
94. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
95. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
96. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
97. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
98. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
99. IAS - International Accreditation Service; www.iasonline.org.
100. ICBO - International Conference of Building Officials; (See ICC).
101. ICC - International Code Council; www.iccsafe.org.
102. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
103. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
104. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
105. IEC - International Electrotechnical Commission; www.iec.ch.
106. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
107. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
108. IESNA - Illuminating Engineering Society of North America; (See IES).
109. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
110. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
111. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
112. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
113. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
114. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
115. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).

SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

116. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
117. ISO - International Organization for Standardization; www.iso.org.
118. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
119. ITU - International Telecommunication Union; www.itu.int/home.
120. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
121. LMA - Laminating Materials Association; (See CPA).
122. LPI - Lightning Protection Institute; www.lightning.org.
123. MBMA - Metal Building Manufacturers Association; www.mbma.com.
124. MCA - Metal Construction Association; www.metalconstruction.org.
125. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
126. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
127. MHIA - Material Handling Industry of America; www.mhia.org.
128. MIA - Marble Institute of America; www.marble-institute.com.
129. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
130. MPI - Master Painters Institute; www.paintinfo.com.
131. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
132. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
133. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
134. NADCA - National Air Duct Cleaners Association; www.nadca.com.
135. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
136. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
137. NBI - New Buildings Institute; www.newbuildings.org.
138. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
139. NCMA - National Concrete Masonry Association; www.ncma.org.
140. NEBB - National Environmental Balancing Bureau; www.nebb.org.
141. NECA - National Electrical Contractors Association; www.necanet.org.
142. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
143. NEMA - National Electrical Manufacturers Association; www.nema.org.
144. NETA - InterNational Electrical Testing Association; www.netaworld.org.
145. NFHS - National Federation of State High School Associations; www.nfhs.org.
146. NFPA - National Fire Protection Association; www.nfpa.org.
147. NFPA - NFPA International; (See NFPA).
148. NFRC - National Fenestration Rating Council; www.nfrc.org.
149. NHLA - National Hardwood Lumber Association; www.nhla.com.
150. NLGA - National Lumber Grades Authority; www.nlga.org.
151. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
152. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
153. NRCA - National Roofing Contractors Association; www.nrca.net.
154. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
155. NSF - NSF International; www.nsf.org.
156. NSPE - National Society of Professional Engineers; www.nspe.org.
157. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
158. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
159. NWFA - National Wood Flooring Association; www.nwfa.org.
160. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
161. PDI - Plumbing & Drainage Institute; www.pdionline.org.

SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

162. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
163. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
164. RFCI - Resilient Floor Covering Institute; www.rfci.com.
165. RIS - Redwood Inspection Service; www.redwoodinspection.com.
166. SAE - SAE International; www.sae.org.
167. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
168. SDI - Steel Deck Institute; www.sdi.org.
169. SDI - Steel Door Institute; www.steeldoor.org.
170. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
171. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
172. SIA - Security Industry Association; www.siaonline.org.
173. SJI - Steel Joist Institute; www.steeljoist.org.
174. SMA - Screen Manufacturers Association; www.smainfo.org.
175. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
176. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
177. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
178. SPIB - Southern Pine Inspection Bureau; www.spib.org.
179. SPRI - Single Ply Roofing Industry; www.spri.org.
180. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
181. SSINA - Specialty Steel Industry of North America; www.ssina.com.
182. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
183. STI - Steel Tank Institute; www.steeltank.com.
184. SWI - Steel Window Institute; www.steelwindows.com.
185. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
186. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
187. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
188. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
189. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
190. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
191. TMS - The Masonry Society; www.masonrysociety.org.
192. TPI - Truss Plate Institute; www.tpinst.org.
193. TPI - Turfgrass Producers International; www.turfgrasssod.org.
194. TRI - Tile Roofing Institute; www.tilerroofing.org.
195. UL - Underwriters Laboratories Inc.; www.ul.com.
196. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
197. USAV - USA Volleyball; www.usavolleyball.org.
198. USGBC - U.S. Green Building Council; www.usgbc.org.
199. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
200. WA - Wallcoverings Association; www.wallcoverings.org.
201. WASTEC - Waste Equipment Technology Association; www.wastec.org.
202. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
203. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
204. WDMA - Window & Door Manufacturers Association; www.wdma.com.
205. WI - Woodwork Institute; www.wicnet.org.

SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

206. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.

207. WWPA - Western Wood Products Association; www.wwpa.org.

N. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
2. ICC - International Code Council; www.iccsafe.org.
3. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

O. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

P. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
 2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
 3. DSCC - Defense Supply Center Columbus; (See FS).
 4. FED-STD - Federal Standard; (See FS).
 5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
 - a) Available from Defense Standardization Program; www.dsp.dla.mil.
 - b) Available from General Services Administration; www.gsa.gov.
 - c) Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
 6. MILSPEC - Military Specification and Standards; (See DOD).
 7. USAB - United States Access Board; www.access-board.gov.
 8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- Q. 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.

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 preinstallation conference before the beginning of each phase of work and with each subcontractor prior to that subcontractor's beginning on-site work.
 - 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 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.

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.

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.
- 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.

SECTION 01210 - ALLOWANCES

- 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. Provide a \$20,000.00 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 coordinated.
- B. Submittal Procedures: Coordinate submittal and preparation with construction, fabrication, other submittals, and activities that require sequential operations with all Subcontractors . 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 Subcontractor. The Contractor shall coordinate with all Subcontractors and prepare an overall construction schedule in five (5) days to submit to the Owner / Architect for approval.
1. Submittal Schedule: After developing the Contractor's Construction Schedule, prepare a schedule of submittals.
 2. Coordinate with list of subcontracts, Schedule of Values, list of products, and the Contractor's Construction Schedule.
 3. 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.
 4. 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.
- E. 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.
 3. Accidents and unusual events.
 4. Stoppages, delays, shortages, and losses.
 5. Meter readings and similar recordings.
 6. Emergency procedures.

SECTION 01300 – SUBMITTALS

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.
- F. 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.**
- G. 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. 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 Subcontractors.
 - 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.
- H. 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:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with trade association standards.
 - c. Compliance with recognized testing agency standards.

SECTION 01300 – SUBMITTALS

- 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.
- I. 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.
 - 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.

SECTION 01300 – SUBMITTALS

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.
- J. 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.
- K. 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.
 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.

SECTION 01300 – SUBMITTALS

- 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 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.**

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.
- 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 brand name or equal equipment equal or 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.

SECTION 01300 – SUBMITTALS

- 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
- 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, Subcontractors, 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 in the bid specifications. 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 4.2.7. 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.
- Will 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: _____

MONTHLY SAFETY & HEALTH REPORT (Required for Payment Application)

Project/Client		Construction Company	Inspector's Name	Date		
				Yes	No	N/A
1	Safety and health protection poster on job.					
2	Emergency telephone numbers conspicuously posted.					
3	First aid kit and supplies on job.					
4	Copy of federal safety and health regulations for construction available on job.					
5	Supply of tags or locks to identify unsafe equipment.					
6	Hard hats used where there is a danger of head injury.					
7	Eye, face, ear, hand, foot & respiratory protection on job and used where necessary.					
8	Fire protection programs and fire extinguishers on job.					
9	Construction area lighted to minimum requirements.					
10	All hand and power tools in safe condition.					
11	All power tools properly guarded and grounded, hand held tools equipped with constant pressure switches.					
12	Electric tools grounded or double insulated.					
13	All extension cords (three wire) grounding type.					
14	Temporary lighting properly protected and installed.					
15	Services and fixed electrical equipment grounded and fused properly.					
16	Subpart "K" electrical complete article.					
17	Abrasive wheels and tools properly equipped and used.					
18	L.P.G. and gas storage, use and handling in accordance with appropriate standards. (i.e. capped, secured upright, cart for handling cylinders)					
19	Welding and cutting and transporting, moving and storing of gas cylinders according to standards.					
20	Employees instructed in safe welding and cutting practices.					
21	Fire protection measures taken and protective equipment used in cutting-welding.					
22	Rigging equipment inspected before each use and employees instructed for safe use.					
23	Housekeeping materials stored properly. / Good housekeeping procedures in effect.					
24	Scrap and debris removed.					
25	Egress route, corridor and passageways clean.					
26	Ladders have no broken or missing rungs or siderails (tag or lock bad ladders).					
27	Ladders used properly (1 to 4 pitch, top and bottom clear, side rails extended 36" above landing area & secured).					
28	Scaffold (rolling and free-standing) more than four times minimum base dimension, equipped with ladder.					
29	Platforms tightly planked or full width of scaffold except for necessary entrance opening.					
30	Platforms secured in place.					
31	Scaffolds provided with guardrail of 2" x 2" or equivalent, 42" high; midrail of 1" x 6" or equivalent; 4" toeboard.					
32	Scaffolds secured to the structure every 26ft. Vertically and 30 ft. horizontally					
33	Floor and roof openings and holes effectively protected with guardrails or covers.					
34	Stairways equipped with railings.					
35	Adequate supply of drinking water on job, clearly marked; paper cups.					
36	Appropriate temporary toilet facilities.					
37	Confirm a safety meeting was held this month.					
38	Perimeter guardrail protection provided around all floors 2 stories and above and roof where applicable.					
39	Adequate ventilation of work and storage spaces.					
40	Temporary heating devices inspected.					
41	Exposed rebar capped.					
42	Masonry walls braced?					
43	Trenches properly sloped for soil type.					
44	Trenches not sloped and over 5' deep are shored and braced adequately.					
45	Trenches 4' and deeper have ladder exits at least each 25' of lateral travel.					
46	Materials hoist operating rules posted in operator's station.					
47	Hoist operator's station overhead protection provided.					
48	Hoistway entrances guarded and guards painted.					
49	Onsite Cranes (Current Inspections, Swings radius marked, Clear of power lines, Outriggers and their dunnage properly set)					

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 SUBMITTALS

- A. Submittals Schedule: Email the 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: Email the baseline schedule. Provide updates on a bi-weekly basis at the progress meetings.
- C. Daily Construction Reports: Email daily.
- D. Material Location Reports: Email at weekly intervals.
- E. Field Condition Reports: Email at time of discovery of differing conditions via RFI with photos and location plan.

1.4 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate subcontractors.

SECTION 01310 - CONSTRUCTION PROGRESS DOCUMENTATION

- 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. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Prepare baseline Gantt Chart schedule. Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion
- C. Update schedule on a bi-weekly basis (for each project meeting). Updates shall show percent complete for each activity.

2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

SECTION 01310 - CONSTRUCTION PROGRESS DOCUMENTATION

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 (RFI). Include a detailed description of the differing conditions, photos and location plan together with recommendations for changing the Contract Documents.

2.4 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.

SECTION 01310 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At bi-weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule at each regularly scheduled progress meeting.
- B. Distribution: Email the 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 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.

SECTION 01400 - QUALITY REQUIREMENTS

- 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.

SECTION 01400 - QUALITY REQUIREMENTS

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. Soils and Geotechnical Engineering
 2. Foundations
 3. Concrete
 4. Masonry Reinforcing
 5. Structural Steel
 6. Cold Formed Steel Framing
 7. Roof Trusses (Wood or Steel)
 8. Sprayed-on Fire Resistant Materials

END OF SECTION 01400



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BULLETIN 03-5

Issued: November 2003

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Subject: Special Inspections

Reference: N.J.A.C. 5:23-2.20(b), 3.14 and 5.3

Chapter 17 of the Building Subcode, entitled "Structural Tests and Special Inspections," is modified by N.J.A.C. 5:23-3.14. As per N.J.A.C. 5:23-2.20(b), for purposes of this chapter of the Building Subcode, a special inspection is an independent verification by a qualified person (special inspector) rendered to the code official for **Class 1 buildings, mass timber elements of Type IV-A, IV-B, and IV-C construction and a smoke control system in any building**. The special inspector is to be independent so that there is no possible conflict of interest. A summary of the special inspections provisions is included to better explain the requirements of the code.

Chapter 17 of the Building Subcode contains requirements for structural tests and special inspections. Certain special inspections required by Chapter 17 of the Building Subcode were deleted upon adoption because, in New Jersey, they are the responsibility of the construction official.

Approved Special Inspection Agencies: Agencies of this nature are regularly engaged in conducting special tests or inspections. Very often, they specialize in one aspect of the construction industry, due to the complexity of construction. This is why a special inspector who is trained in a specific area may be needed to conduct certain inspections. Special inspectors are independent of the contractor and responsible to the building owner or building owner's agent. The established and recognized special inspector, or special inspection agency proposed by the permit applicant for each special inspection, must be acceptable to the construction official.

Certified Special Inspectors: As per N.J.A.C. 5:23-5.3, special inspectors are those who will be required to perform field inspections for structural welding, structural steel and bolting, concrete placement, reinforced concrete, prestressed concrete, structural masonry, mass timber construction, soils, spray-applied fireproofing, and exterior insulation finish systems (EIFS).

Building Permits and Reports: The permit applicant is required to submit a statement of the special inspections to be performed at the time of application. The statement is to be prepared by the responsible person in charge of the work.

Structural Systems: Special inspections are required for the following as per the corresponding sections of the Building Subcode.

- *Fabrication of Structural Load-Bearing Members/Assemblies*, Section 1704.2.5: These inspections are normally handled through an in-plant, quality-control process and reports are forwarded to the local construction code office when the elements are delivered.
- *Steel Construction*, Section 1705.2: This section requires the inspection of certain aspects of the on-site erection of structural steel, cold-formed steel deck, open-web steel joists and joist girders, and cold-formed steel trusses spanning 60 feet or greater. These special inspections include welding, high-strength bolting, joint connection, and temporary restraint/bracing and permanent individual truss member restraint/bracing of cold-formed steel trusses. There are specific exceptions listed in the above-referenced code section. Additional quality control and quality assurance information is available in Chapter N of AISC 360, Specification for Structural Steel Buildings, at https://www.aisc.org/globalassets/aisc/publications/standards/a360-16-spec-and-commentary_june-2018.pdf
→ Per N.J.A.C. 5:23-5.3, certified special inspectors are authorized to carry out field inspections for steel construction using the above-referenced section and the following:
 1. Certified Structural Welding Special Inspector -- Inspections in compliance with the applicable AWS standard.
 2. Certified Structural Steel and Bolting Special Inspector -- Inspections are performed to verify compliance with the details shown on the approved construction documents such as bracing, stiffening, member locations, and proper application of joint details at each connection. Inspection of open-web steel joists and joist girders are required to be performed in accordance with Table 1705.2.3. Also, high-strength bolts are to be inspected in accordance with AISC 360 Tables N5.6-1, 6-2 and 6-3.
- *Concrete Construction*, Section 1705.3 This section addresses the placement of structural concrete. Exceptions are listed in the above-referenced section.
→ Per N.J.A.C. 5:23-5.3, certified concrete placement, reinforced concrete and prestressed concrete special inspectors are authorized to carry out field inspections for concrete construction using the above-referenced sections
- *Masonry Construction*, Section 1705.4: This section addresses the placement of structural masonry elements.
→ Per N.J.A.C. 5:23-5.3, certified structural masonry special inspectors are authorized to carry out field inspections of structural masonry and vary based on “occupancy category” as per the above-referenced section.
- *Mass timber construction*, Section 1705.5.3: This section requires inspections of mass timber elements in Types IV-A, IV-B and IV-C construction.
→ Per NJAC 5:23-5.3, certified special inspectors are authorized to carry out continuous and periodic inspections of mass timber construction in accordance with Table 1705.5.3

- *Soils*, Section 1705.6: This section addresses existing site soil conditions, fill placement and load-bearing requirements. A soils report, required as per Section 1803 of the Building Subcode, is used to determine compliance with the placement of load-bearing fill.
→ Per NJAC 5:23-5.3, certified special inspectors are authorized to carry out continuous and periodic inspections of soils in accordance with Table 1705.6.
- *Driven deep (Pile) Foundations*, Sections 1705.7, 1705.8 and 1705.9: These sections require special inspections during the installation of driven, cast-in-place and helical pile foundations. There are no current certification requirements for driven deep foundations special inspectors, however, a licensed design professional is required.

Special Inspections for Seismic Resistance: Special inspections are required for seismic force-resisting systems; designated seismic systems; and architectural, mechanical, and electrical components in Seismic Design Category D, E and F buildings¹. The following components are special inspections related to seismic resistance found in Section 1705.13 of the Building Subcode.

- * Structural Steel
- * Structural Wood
- * Cold-Formed Steel-Light Frame Construction
- * Designated seismic systems
- * Architectural Components
- * Plumbing, Mechanical and Electrical Components
- * Seismic Isolation Systems
- * Storage Racks
- * Cold-Formed Steel Special Bolted Moment Frames

Structural Testing for Seismic Resistance: Prior to construction, all materials and assemblies used for isolation damping systems in Seismic Design Category D, E and F buildings¹ are required to be tested and verified as per Section 1705.14 for seismically isolated structures.

Finishes:

- *Sprayed, Fire-Resistant Materials*, Section 1705.15: Special inspections are required for sprayed, fire-resistant materials applied to floor, roof and wall assemblies and structural members. Details include condition of the substrates, thickness of application, density in pounds per cubic foot, bond strength adhesion/cohesion and condition of the finished application.
→ Per N.J.A.C. 5:23-5.3, certified special inspectors are authorized to carry out field inspections for sprayed, fire-resistant materials using the above-referenced section and are to be based on the fire-resistance design as designated in the approved construction documents.
- *Mastic and Intumescent Fire-Resistant Coatings*, Section 1705.16: Special inspections are required for mastic and intumescent fire-resistant coatings applied to structural elements and decks and are to be based on the fire-resistance design as designated in the approved construction documents.

- *Exterior Insulation and Finish Systems (EIFS)*, Section 1705.17: Special inspections are required for all EIFS applications. *Exceptions:* installations over a water-resistive barrier with a means of draining moisture to the exterior, or when installed over masonry or concrete
→ Per N.J.A.C. 5:23-5.3, certified special inspectors are authorized to carry out field inspections for all EIFS using the above-referenced section.
- *Fire-resistant penetrations and joints*, Section 1705.18: Special inspections are required for through-penetrations, membrane penetration firestops, fire-resistant joint systems and perimeter fire containment systems in high-rise buildings, in buildings assigned to Risk Category III or IV, or in fire areas containing Group R occupancies with an occupant load greater than 250.

Special Inspection for Smoke Control: A special inspector, qualified as per Section 1705.19.2 of the Building Subcode, is required to test smoke control systems. The inspector inspects for leakage testing, recording of device location, pressure difference testing, flow measurements, and detection and control verification.

Special Cases: N.J.A.C. 5:23-2.19(a) authorizes the building subcode official to require special inspections for proposed work that is unusual in nature. Some examples include alternative construction materials and systems, unusual design applications of materials, and materials and systems required to be installed in accordance with additional manufacturer's instructions that prescribe requirements not contained or referenced in the Building Subcode.

Examples:

- Any building that meets N.J.A.C. 5:23-4.3A(d)3, Class 1 building → apply applicable special inspections.
- Any Class building of Type IV-A, IV-B, and IV-C construction → apply mass timber special inspection.
- Any Class building of any construction type with a smoke control system → apply smoke control special inspection.

¹ *Seismic Design Categories are determined in accordance with Section 1613 of the building subcode. In order to utilize the equations, figures and tables of this section, one will need the Site Class definition per the ASCE 7, as adopted at Chapter 35 of the building subcode, and the Risk Category per Table 1604.5 of the building subcode.*

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.

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

- 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 11th**. 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.

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1. Provide safety showers, eyewash fountains, and similar facilities for convenience, 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.

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

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. 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.

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

4. Enclosure Fence: Before excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated or enclose the entire site or the 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.

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

2. At Substantial Completion, clean and renovate permanent facilities used during the 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 reseeding 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.

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.
- 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.

SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

- 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.
 - 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.

SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

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.

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.

SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

- 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.
- 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.

SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

- 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.
- 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.

SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

- 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.

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

- a. 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. Where products are specified by name not 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 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 Construction Manager and Architect 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 pay the Construction Manager and/or Architect 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. 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.

1.2 PRODUCTS

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:
1. Startup and shutdown.
 2. Emergency operations and safety procedures.
 3. Noise and vibration adjustments.

SECTION 01700 - CONTRACT CLOSEOUT

- 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 shall be 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



Engineering
& Design

Geotechnical Evaluation Report

June 14, 2024

Proposed Bleachers and Field House

Schalick High School

718 Centerton Road

Pittsgrove Township, Salem County, New Jersey

Prepared for:

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Project No. 24003905A

Table of Contents

Introduction.....	1
Site and Project Description	1
Subsurface Exploration and Laboratory Testing Program.....	1
Subsurface Conditions	2
Regional Geology	2
Subsurface Description.....	2
Groundwater Conditions	3
Development Issues.....	3
Subgrade Soil Variability.....	3
Discussion and Recommendations	4
Site Preparation	4
High Energy Vibratory Proof-Rolling	5
Over-Excavation / Stabilization	6
Load Bearing Fill.....	6
Foundation Recommendations.....	7
Floor Slab.....	8
Seismic Considerations	9
Surface Water and Groundwater Control.....	9
Temporary Excavations	9
Below Grade Utilities.....	10
Existing Utilities	10
Construction Observation	11
Closing	11
Clarification	11
Limitations.....	12



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Figures

Figure 1: Site Location Map

Figure 2: Exploration Location Plan

Appendices

Appendix A: Test Boring Logs

Appendix B: Laboratory Test Results

Appendix C: Seismic Information

Introduction

This report presents the results of the geotechnical exploration undertaken to provide geotechnical design criteria and foundation support recommendations for the proposed new bleachers and field house located at Schalick High School, 718 Centerton Road in Pittsgrove Township, Salem County, New Jersey.

Colliers Engineering & Design (CED) understands that the proposed development includes the construction of new bleachers and a field house. The subsurface exploration was conducted in accordance with our proposal 24003905P (dated April 16, 2024), and your subsequent written authorization. The purposes of this exploration were to evaluate the existing subsurface conditions at the project site, and to provide geotechnical-related design and construction recommendations for the proposed bleachers and field house.

Our scope of services for this exploration included the completion of four test borings, laboratory testing of representative soil samples, engineering analyses of the subsurface data obtained from this field exploration program, and the preparation of this report.

Site and Project Description

The subject project site is located at Schalick High School, in Pittsgrove Township, as shown on the attached Site Location Map, Figure 1. The site at Schalick High School currently contains the existing bleachers and field house, adjacent to the football field and track, various unpaved pathways, and athletic fields. Schalick High School is bounded by Centerton Road, agricultural fields, athletic fields, and developed residential and commercial properties.

Based on our review of the Aerial Schematic, prepared by Garrison Architects, dated March 14, 2023, and our correspondence with the Client, we understand that the proposed development consists of new bleachers and a new field house to replace the existing structures. The new structures are anticipated to be supported by traditional shallow foundations.

Existing site grades in the immediate area of the proposed new structures are relatively level. Based on our understanding of the proposed development, we anticipate that the grade cuts/fills required to achieve final site grades will be minimal (i.e. less than 2 feet).

Subsurface Exploration and Laboratory Testing Program

The subsurface conditions at the site were explored on May 17, 2024, through the advancement of four test borings, identified herein as TB-1 to TB-4. The test borings were generally performed within the proposed bleachers and field house footprints. The explorations were located in the field by CED personnel based on offsets from existing site features and were performed outboard of the existing/proposed structures. The approximate exploration locations are shown on the Exploration Location Plan, Figure 2.

The test borings were advanced to termination depths ranging from approximately 20 feet to 25 feet below ground surface (bgs) by Soil Borings Drilling, LLC of Haddon Township, New Jersey, using standard hollow-stem auger drilling techniques. Split spoon sampling was performed in accordance with ASTM D1586 (Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils). The number of blows required to drive the split spoon every 6 inches into the soil was recorded and is shown on the test boring logs. The sum of blows for the interval from 6 inches to 18 inches is the N-value. The N-value indicates the soil resistance encountered within each sampling interval. Upon completion, the test borings were backfilled with soil cuttings.

The test borings were performed under the full-time technical observation of CED. Representative soil samples were collected and visually identified in accordance with the Burmister Soil Classification System. Details pertaining to the subsurface conditions encountered are presented on the Test Boring Logs in Appendix A.

The laboratory testing was programmed to determine the physical properties of the subsoils, as well as to augment the field exploration. The stratigraphic continuity and physical characteristics of the subsoils were evaluated by the determinations of grain size distribution by mechanical sieve. The laboratory test results are presented in Appendix B.

Subsurface Conditions

Regional Geology

The project site is located within the Atlantic Coastal Plain Physiographic Province of New Jersey. The Natural Resources Conservation Service (NRCS) Web Soil Survey, and the Rutgers Engineering Soil Survey of New Jersey (No. 14) for Salem County, were reviewed for soil properties at the site. Review of the published information revealed the site to be underlain by *Sassafras sandy loam, 2 to 5 percent slopes, Northern Coastal Plain (SacB)* and *AM-12/M-23 (ge)* soils. The surficial material consists of stratified alluvial material containing silty and clayey, poorly sorted, sand and gravel, overlying stratified marine deposits containing silty sand and sand. Soil colors range from brown or reddish brown, and gray, to yellow or orange.

According to the *Bedrock Geologic Map of New Jersey* (Dalton, Richard F., et. al., 2014), the surficial soils are underlain at depth by the *Cohansey Formation (middle Miocene) (Tch)*. This formation consists of medium to coarse grained quartz sand containing local beds of clay. The formation tends to be white to yellow.

Subsurface Description

Based on the results of the test borings performed at the two sites, the generalized subsurface conditions may be described below, in order of depth:

- **Surface Cover:** The test borings encountered surface cover consisting of approximately 4 inches to 6 inches of topsoil, except test boring TB-4 encountered approximately 3 inches of gravel cover.

- **Stratum S/\$C (Granular Soils Interbedded with Fine-Grained Soils):** Underlying the surface cover in each of the test borings was a stratum consisting of predominantly coarse to fine sand with intermixed and interbedded of silty clay with variable amounts of medium to gravel (trace to some), where present. The Stratum S/\$C soils extended to the test boring termination depths ranging from 20 to 25 feet bgs. The Standard Penetration Test (SPT) or N-values within the Stratum S/\$C soils vary between 1 blow per foot (bpf) to 26 bpf, averaging 13 bpf. The relative density of this material was generally encountered to be very loose to medium dense.

These subgrade findings are generally consistent with the mapped Regional Geology.

Groundwater Conditions

Groundwater was encountered in each of the test borings at depths ranging from approximately 4 feet to 6 feet bgs. In our opinion, the groundwater conditions encountered are indicative of the regional groundwater table. It should be noted that fluctuation in groundwater levels can occur due to several factors, including variations in precipitation, seasonal changes, and site development activities, which can alter surface water drainage paths. If precise groundwater levels are required, it is recommended that a monitoring well be installed and monitored for several months.

Development Issues

Based on our geotechnical exploration, we have identified the following issues to be addressed during the design and construction of the proposed building:

Subgrade Soil Variability

The soil subgrade profile consists of variable density, poorly graded sand with interbedded silty clay and moderate amounts of gravel (Stratum S/\$C). In their current condition, these soils are not suitable for the direct support of the proposed variable loading conditions (foundations, slab-on-grade, pavements, etc.) due to concerns with bearing stability, as well as potential for excessive total and differential settlements when loaded. These inconsistent subgrade materials, having variable apparent hard pans and/or gravel pockets, as well as a deeper silt layer, as in test boring TB-3, will require remediation to provide adequate support capacity and to control potentially high total and differential settlements.

We recommend a limited stabilization program be performed within the building footprint and bleacher areas, prior to site development to compact and densify the existing near surface soils. The stabilization program will increase soil strength, improve uniform bearing conditions, and thereby reduce post-construction settlements. The limited stabilization program should be performed after demolition and removal of existing onsite structural features, after final site stripping of topsoil, after performing any grade cuts, and prior to the placement of load bearing fill to reach proposed final grades. Refer to the *Site Preparation*, *High Energy Vibratory Proof-Rolling*, and *Load Bearing Fill* sections for specific recommendations.

Excavations within these loose, granular materials will likely result in sidewall instability. Therefore, in addition to routine utility trench shoring techniques, Contractors should also be prepared to temporarily brace other shallow excavations (e.g. "stay forms") prior to concrete placement for foundations, etc.

Discussion and Recommendations

The test borings indicate that the site is favorable for the use of traditional shallow foundations to support the proposed new bleachers and field house, following the implementation of a limited stabilization program to densify existing near surface soils. Contractors should be prepared to provide routine site preparation and load bearing fill procedures, outlined herein. The following sections summarize our recommendations with respect to site and subgrade preparation, as well as the construction of foundations and site utilities.

Site Preparation

The purpose of these site preparation procedures is to provide stable and uniform bearing conditions for the proposed foundations. The following procedures should be performed under the technical supervision of the Geotechnical Engineer.

- Install soil erosion and sedimentation control devices, as well as temporary stormwater management facilities, as specified by Site/Civil Engineer.
- Site preparation and earthwork should be performed during dry and favorable weather conditions.
- Maintain positive drainage conditions throughout construction, avoiding unnecessary ponding of stormwater in excavations or low areas of the site. Seal-roll exposed soil or subgrade surfaces prior to rain or snow events, and promptly remove any standing water immediately afterwards.
- Any existing utility locations should be verified in the field and relocated or abandoned as necessary, prior to construction. If the option to abandon utilities in-place is chosen, we recommend that a lean cement grout (250 psi) be used to fill the underground utility lines.
- Remove and dispose of vegetation and trees at an appropriate off-site facility. Strip topsoil in its entirety and stockpile onsite for later use within landscaped areas.
- Complete demolition of existing site structures/site features within the vicinity of the proposed improvements, as necessary, in accordance with the demolition plan and the following guidelines.
 - Demolish and remove structural elements (foundations, slabs, etc.) in their entirety and backfill the resulting excavation with load bearing fill in accordance with the *Load Bearing Fill* Section of this report.
 - If feasible, implement a recycling program consisting of the processing of inert building materials (concrete, block, brick, stone, etc.) to a gradation similar to a

NJDOT 901.10 dense graded aggregate (DGA), if intended for reuse as load bearing fill. Alternatively, remove demolition debris from the site in accordance with local and state regulations.

- If any unsuitable (deleterious) fill, buried debris, or obstructions are encountered, they should be removed in their entirety and backfilled with compacted load bearing fill.
- Complete a stabilization program within structural areas of the site (foundation and slab footprints, etc.), plus a 5-foot perimeter (see the *High Energy Vibratory Proof-Rolling* section below). After the final subgrade has been reached (within cut areas) and prior to load bearing fill placement (within fill areas), compact the exposed subgrades with a minimum 10-ton roller with a minimum of six passes applied in a crisscrossing pattern, where possible. Any remaining unstable zones should be removed as directed by the onsite representative of the Geotechnical Engineer.
- Following satisfactory subgrade preparation, place and compact load bearing fill, as needed, in thin, controlled, compacted lifts to achieve the final subgrade elevations in accordance with the recommendations presented in the *Load Bearing Fill* section of this report.
- Foundations should not be constructed on frozen ground. Any frozen foundation and slab subgrade materials should be removed and replaced with compacted load bearing fill or be permitted to thaw and recompacted prior to the placement of reinforcement and concrete. The same recommendations apply to frozen subgrade encountered during placement of load bearing fill.
- Trench excavations should be performed in accordance with the recommendations presented in *Temporary Excavations* and *Surface Water and Groundwater Control* sections of this report. Trench instability should be anticipated in open excavations.
- In accordance with the Occupational Safety and Health Administration (OSHA) requirements, all excavations should be properly sloped or otherwise structurally retained to provide stable and safe working conditions.

High Energy Vibratory Proof-Rolling

Following demolition, site clearing, and excavating to proposed subgrade bearing levels (in cut areas), the exposed subgrade soils should be improved by utilizing high energy (10-ton minimum static weight) vibratory rollers with a minimum of six passes applied in a crisscrossing pattern, where available, prior to the placement of any load bearing fills. A smooth drum roller is recommended to be utilized on the predominantly granular soil. The resulting energy may improve densities ranging from 3 feet to 4 feet below the exposed site grades depending upon the nature of the soils and groundwater levels at the time. The vibratory or static modes should be used as directed by the onsite representative of the Geotechnical Engineer, depending on possible interference from groundwater conditions. The compactor should be used in static mode within 5 feet of any nearby existing structures.

The use of high energy vibratory proof-rolling is required within the footprint areas of the proposed foundations, including a minimum of 5 feet outboard of the proposed perimeters, where possible. Areas that do not respond favorably to high energy proof-rolling may require the use of over-excavation and replacement methods. See the *Over-Excavation / Stabilization* and *Load Bearing Fill* sections of this report for further details.

Over-Excavation / Stabilization

The near surface subgrade (Stratum S/\$C) contains very loose to medium dense granular soils that require stabilization. During subgrade preparations, this stratum should be carefully observed during the high-energy vibratory proof-rolling and evaluated by the onsite representative of the Geotechnical Engineer to confirm suitability prior to placement of load bearing fill. Any remaining unstable zones should be removed as directed by the onsite representative of the Geotechnical Engineer.

Any loose, soft, or wet soil and soil containing organic material or significant debris are not considered suitable support for foundations, and if encountered, should be excavated in their entirety and replaced with load bearing fill compacted in place. If any buried debris or obstructions are encountered, they should be removed in their entirety and backfilled with compacted load bearing fill.

Construction during extended wet weather periods could create the need to over-excavate exposed soils if they become disturbed and cannot be recompacted due to elevated moisture content and/or weather conditions. The need for over-excavation should be confirmed through continuous observation and testing by the onsite representative of the Geotechnical Engineer. Selective drying and recompaction of unsuitable subgrades may be accomplished by scarifying or windrowing surficial material during extended periods of dry and warm weather. Otherwise, use of imported material or chemical subgrade stabilization methods, such as cement or fly ash, could become necessary at additional cost. The need for subgrade over excavation and/or stabilization will be dependent, in part, on the subgrade protection effort exercised by the Contractor.

The length of time that the exposed subgrade remains exposed to weather conditions should be kept to a minimum so as to not generate more unsuitable material removal. Onsite soils and fill exposed to weather conditions may soften, requiring removal and replacement prior to foundation installation, due to their sensitivity to moisture. Water that accumulates in the bottom of excavations should be removed promptly.

Load Bearing Fill

Fill/backfill proposed to support site features that will be adversely affected by settlement, as well as fill placed within 5 feet of the structures is considered load bearing fill. Materials used as load bearing fill should consist of visually stable, inorganic, readily compactable, predominantly granular materials that are free of trash, debris, organic inclusions, and other deleterious material, frozen material, or excess moisture.

The existing onsite materials may be re-used as load bearing fill, provided they meet the requirements above, are sufficiently moisture conditioned, and any organic material, as well as fragments larger than 4 inches, are removed. If additional materials are required to establish the proposed site grades, we recommend using imported fill consisting of well-graded granular soils with no more than 15% fines.

Load bearing fill should be placed in essentially horizontal lifts, with a maximum loose thickness of 8 inches. Each lift should be compacted to at least 95 percent of the maximum dry density, as determined by the modified Proctor test (ASTM D1557). In addition to meeting the compaction criteria, the compacted material should maintain visual stability beneath the compaction equipment and be observed and documented by the onsite representative of the Geotechnical Engineer. Moisture contents should be maintained near the optimum moisture content during compaction procedures to facilitate proper compaction. Adjustments to the lift thickness and/or compaction equipment may be required, as directed by the onsite representative of the Geotechnical Engineer, based on prevailing weather conditions at the time of fill placement and performance of the compacted soils.

Foundation Recommendations

The test borings indicate that the proposed new bleachers and field house can be adequately supported using a conventional shallow foundation system, provided that the site-specific stabilization and load bearing fill procedures outlined herein are implemented. Conventional spread and strip footings may be designed and proportioned assuming a **maximum allowable soil bearing pressure of 2,000 pounds per square foot (psf)**. The allowable bearing capacity may be increased by 30% for transient loadings.

Footings may be supported on compacted soils of Stratum S/\$C, or on newly placed compacted load bearing fill. Any loose, soft, or wet soil and soil containing organic material or significant debris are not considered suitable foundation support, and if encountered, should be excavated in their entirety and replaced with load bearing fill compacted in place. See the *Over-Excavation / Stabilization* and *Load Bearing Fill* sections of this report for further details.

Footing subgrades should be compacted using a “jumping jack” or other trench compaction equipment upon completion of footing excavation and prior to reinforcing steel installation (plate tamper is not suitable). The foundation bearing surface preparation should be observed by the onsite representative of the Geotechnical Engineer prior to foundation construction (i.e. reinforcing steel installation and concrete placement) for consistency with the recommended design allowable soil bearing pressure.

The length of time that the prepared subgrade remains exposed to weather conditions should be kept to a minimum so as to not generate more unsuitable material removal. Onsite soils and fills exposed to weather conditions may soften, requiring removal and replacement prior to placement of fill/additional fill and foundation installation. Water that accumulates in the bottom of excavations should be removed promptly. Consideration could be given to placing tarps over stockpiles of fill material prior to precipitation events to help control soil moisture.

The minimum width of all strip footings should be 24 inches, and the minimum horizontal dimension of all isolated spread footings should be 36 inches, regardless of the bearing pressure developed. All exterior footings subject to frost action should be based at least 30 inches below the adjacent exterior grade for frost protection and bearing considerations. We recommend that the shallow foundations bear below a zone bounded by a plane that extends outward and upward on a 1:1 slope from any underground utility excavation, or other underground features.

Following proper site preparation techniques, the foundations should be capable of supporting the proposed loads with the potential for post-construction total settlement estimated at less than 1 inch, and 0.5 inches of differential settlement post-construction settlement between adjacent columns. These values are generally within tolerable limits for these types of structures.

Floor Slab

Providing the proposed field house building subgrade is prepared, compacted, and proof-rolled under the observation of an onsite representative of the Geotechnical Engineer as described in the above sections of this report, the floor slabs may be supported on-grade in accordance with the following criteria.

The floor slab subgrade should be compacted with a large vibratory roller immediately prior to installation of the aggregate base to re-compact any materials disturbed by previous construction activities or adverse weather conditions. Any unstable zones detected that cannot be stabilized by additional compaction efforts should be removed, and the excavated area backfilled with load bearing fill.

An aggregate base course of a dense-graded aggregate (DGA) consisting of crushed stone or recycled concrete (NJDOT 901.10) is recommended below the slab to promote uniform support and curing conditions. If placed immediately prior to slab construction, the minimum compacted thickness should be 4 inches. Alternatively, if placed earlier as the final lift of structural fill and used as a working surface during construction, the minimum compacted thickness should be 6 inches. This second approach is acceptable provided the aggregate base is repaired, re-graded, and re-compacted as needed prior to concrete placement. All structural fill supporting the floor slab, including the DGA base course, should be compacted to a minimum of 95 percent of the maximum dry density, as determined by the modified Proctor test (ASTM D1557). The aggregate should be dampened just prior to concrete placement to allow for proper curing of the concrete. These procedures are intended to interrupt the rise of capillary moisture through the slab and to provide uniform concrete curing conditions.

We anticipate that, following proper site preparation, the subgrade soils and imported load bearing fill can achieve a Modulus of Subgrade Reaction on the order of 150 pounds per cubic inch (pci). Reinforced concrete floor slabs should be simply supported at wall and column junctures to allow unrestricted rotation of the slab edges. Control joints should be provided at the slab and wall/column interfaces to reduce the potential for slab cracking, should the building settle differentially from the floor slab. Alternatively, the slabs should be free to undergo vertical deflections at the edges.

Based on the existing subgrade soil at the site, a coefficient of sliding friction of 0.35 may be used for design of a floor slab without a vapor retarder. Where vapor retarders are used, a reduced coefficient of sliding friction of 0.20 should be used for design.

Seismic Considerations

In accordance with the provisions of the current International Building Code (New Jersey Edition), the site generally has a Site Class Definition of "D" for the existing subsurface soil and groundwater conditions. This classification was determined by utilizing the Standard Penetration Test (SPT) blow count data through the upper 25 feet of the subsurface profile. Medium compact conditions were assumed throughout the remainder of the soil profile to a depth of 100 feet. The following design parameters are provided utilizing tables in the IBC Code and United States Geological Survey (USGS) design tools:

From the USGS and using ASCE 7-16 information (See Appendix C):

Short Period Spectral Acceleration (S_s)	0.153g
Spectral Acceleration at 1 Second (S_1)	0.044g
Peak Ground Acceleration (PGA)	0.082g

Surface Water and Groundwater Control

Surface grading should be maintained on a continual basis during construction to direct surface water runoff away from open excavations and prevent water from pooling on subgrade soils. The contract documents should require the contractor to provide whatever means and methods are necessary to maintain stable excavations and subgrade conditions at all times during construction.

Due to shallow groundwater encountered in the test borings and the presence of fine-grained soils, groundwater and/or perched water conditions may be encountered within shallow excavations. Should groundwater, perched water or seepage be encountered during installation of below grade structures or utilities, pumping using standard sump pit and pump techniques should be sufficient to control such water conditions, provided excavations extend no deeper than 2 feet below the groundwater level. If needed, sump pits should be installed outboard of the proposed structural areas and should be filled with minimum ¾-inch clean stone and lined with geotextile filter fabric to prevent excessive particle migration, particularly if heavy pumping is required. Pumped water should be discharged away from structural areas and open excavations, and filtered as per soil erosion / sediment control requirements and any applicable environmental regulations. Groundwater discharge permits will need to meet local requirements. Consideration should be given to the use of a smooth bucket for excavations at or below the water level, or otherwise within saturated soils, to help limit the amount of disturbance to the subgrade that otherwise typically occurs with a toothed bucket.

Temporary Excavations

Temporary excavation stability is a function of many factors including the presence and abundance of groundwater, the type and density of the various soil strata, the depth of excavation, surcharge

loadings adjacent to the excavation, and the length of time and weather conditions while the excavation remains open. The loose sandy soils near the ground surface and any imported load bearing fill are likely to result in excavation bank stability problems for foundation and utility construction. Temporary bracing or “stay-forms” may be necessary for foundation and/or utility excavations.

Our opinion is that the existing site soils and any new load bearing fill will generally be classified as “Type C” soils under OSHA excavation regulations. It is the responsibility of the Contractor to maintain safe excavations in conformance with all applicable federal, state, and local regulations such as OSHA. All excavations should conform to applicable sloping, benching, or shoring standards for worker access. Temporary sheeting and shoring should be designed and sealed by a Professional Engineer registered in the State of New Jersey. These designs should be submitted for review by CED prior to construction.

Below Grade Utilities

The majority of site soils will be suitable for support of subsurface utilities. We offer the following recommendations specific to utility construction:

- Prior to installation, the bearing surface for utility structures (manholes, vaults, etc.) should be evaluated by the onsite representative of the Geotechnical Engineer. Should debris or unsuitable soils be encountered at the utility invert levels, the subgrade should be over-excavated a minimum depth of 6 inches and backfilled with load bearing fill material to provide uniform support.
- The utility structures should receive a bedding of at least 4 inches of dense-graded aggregate (DGA), as defined by current NJDOT construction standards.
- Any excavated utility trenches beneath the proposed finished floor or pavement subgrades should have the subgrade soils compacted and evaluated by the onsite representative of the Geotechnical Engineer, then backfilled with compacted load bearing fill in accordance with the recommendations outlined in the *Load Bearing Fill* section of this report. If loose or otherwise unstable material is present at the subgrade level, this material should be removed and replaced with load bearing fill.

The proposed underground utility installation is not anticipated to be impacted by groundwater concerns, provided they are installed at typical depths of 4 feet to 6 feet or less below existing site grades. Utility excavations may encounter perched water conditions in the near surface due to the presence of silts and clays, especially if construction starts during or after rainy seasons. Dewatering measure should be implemented, as necessary, as described herein.

Existing Utilities

Any existing underground utilities should be located, and those utilities which are not reused should be removed and capped. The utility trenches that are in the influence zone of new construction are recommended to be backfilled with load bearing fill or grouted, as needed. Underground utilities, which are to be reused, should be evaluated by the Structural Engineer and utility backfill should be

evaluated by the Geotechnical Engineer to determine their suitability for support of the planned construction. If any existing utilities are to be preserved, grading operations must be carefully performed to not disturb or damage the existing utility.

Construction Observation

Regardless of the thoroughness of a geotechnical engineering exploration, there is always a possibility that conditions between the test borings and below the depths explored may be different from those encountered in the test borings, that conditions are not as anticipated by the designers, or that the construction process has altered the subsurface conditions. Therefore, geotechnical engineering construction observation should be performed under the supervision of a Geotechnical Engineer from CED who is familiar with the intent of the recommendations presented herein. This observation is recommended to evaluate whether the conditions anticipated in the design actually exist or whether the recommendations presented herein should be modified where necessary. CED should also provide on-site observation and testing on a full-time basis during excavation operations, subgrade remediation and preparation, foundation installation, and all critical earthwork operations. CED recommends that a representative from CED be on-site on a full-time basis during the earthwork construction and subgrade preparation. CED has the capability of providing these services and can provide a proposal to perform the on-site quality assurance observation and materials testing.

Closing

The conclusions and recommendations presented in this report are based, in part, on the explorations accomplished for this evaluation. The number, location, and depth of the explorations were completed within the constraints of budget and site access to yield the information to formulate the recommendations. We recommend that we be provided the opportunity for general review of the project plans and specifications when they become available, to confirm that the recommendations and design considerations presented in this report have been properly interpreted and implemented into the project design package.

We recommend that the test boring logs be a part of the specifications for the project along with a reference to the plan sheets that contain the test boring locations for informational purposes. Should the data not be adequate for the Contractor's purposes, the Contractor may make, prior to bidding, his own explorations, tests, and analyses.

Clarification

This report has not been prepared to serve as the plans and specifications for actual construction without the appropriate interpretation by the project Architect, Structural Engineer, and/or Civil Engineer. This report has been based on assumed conditions and characteristics of the proposed development where specific information was not available. The conclusions, projections, and recommendations presented in this report cannot be applied to other building configurations or loads. The project plans and specifications should be submitted to us for review so that the

geotechnical-related conclusions and recommendations provided herein have been correctly interpreted and are incorporated into the design.

We emphasize that this report should be made available to prospective bidders for informational purposes. We would recommend that the project specifications contain the following statement:

"A geotechnical engineering report has been prepared for this project by Colliers Engineering & Design. This report is for informational purposes only and should not be considered part of the contract documents. The opinions expressed in this report are those of the Geotechnical Engineer and represent their interpretation of the subsurface conditions, field and laboratory testing, and the results of analyses which they have conducted. Should the data contained in this report not be adequate for the Contractor's purposes, the Contractor may make, prior to bidding, his own investigation, tests, and analyses."

Limitations

This geotechnical exploration program has been performed in accordance with generally accepted engineering practice and applicable design standards as referenced herein. This report and its supporting documentation have been prepared exclusively for the use of our Client pursuant to the Agreement between CED, Inc. and the Client. All provisions set forth in the Agreement and the Business Terms and Conditions attached thereto are incorporated herein by reference. No warranty, express or implied, is made herein.

The findings, conclusions, and recommendations contained in this report are based on data revealed by limited exploration and testing of the subsurface at the referenced project site. The explorations indicate subsurface conditions at the specific locations and times explored, and only within the depths penetrated. Should deviations from the described subsurface conditions be encountered at any time prior to or during construction, CED should be notified immediately so that modifications to our recommendations can be made, if necessary.

This report is applicable only to the contemplated project design described herein, and any changes in the design should be brought to our attention so that we may evaluate whether our recommendations will be affected. CED is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of CED. As such, the conclusions and recommendations contained in this report are pending our review of final plans and specifications, and verification of subsurface conditions by our direct observation at the time of construction.

This report and supporting documentation are instruments of service. The subject matter of this report is limited to the facts and matters stated herein.



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Our recommendations are based upon the assumption that the services of a qualified Geotechnical Engineer will be retained for the observation of excavation operations, foundation installation, and all critical earthwork operations. CED has the capability of providing these services and can provide a proposal to perform the on-site quality assurance observation and materials testing.

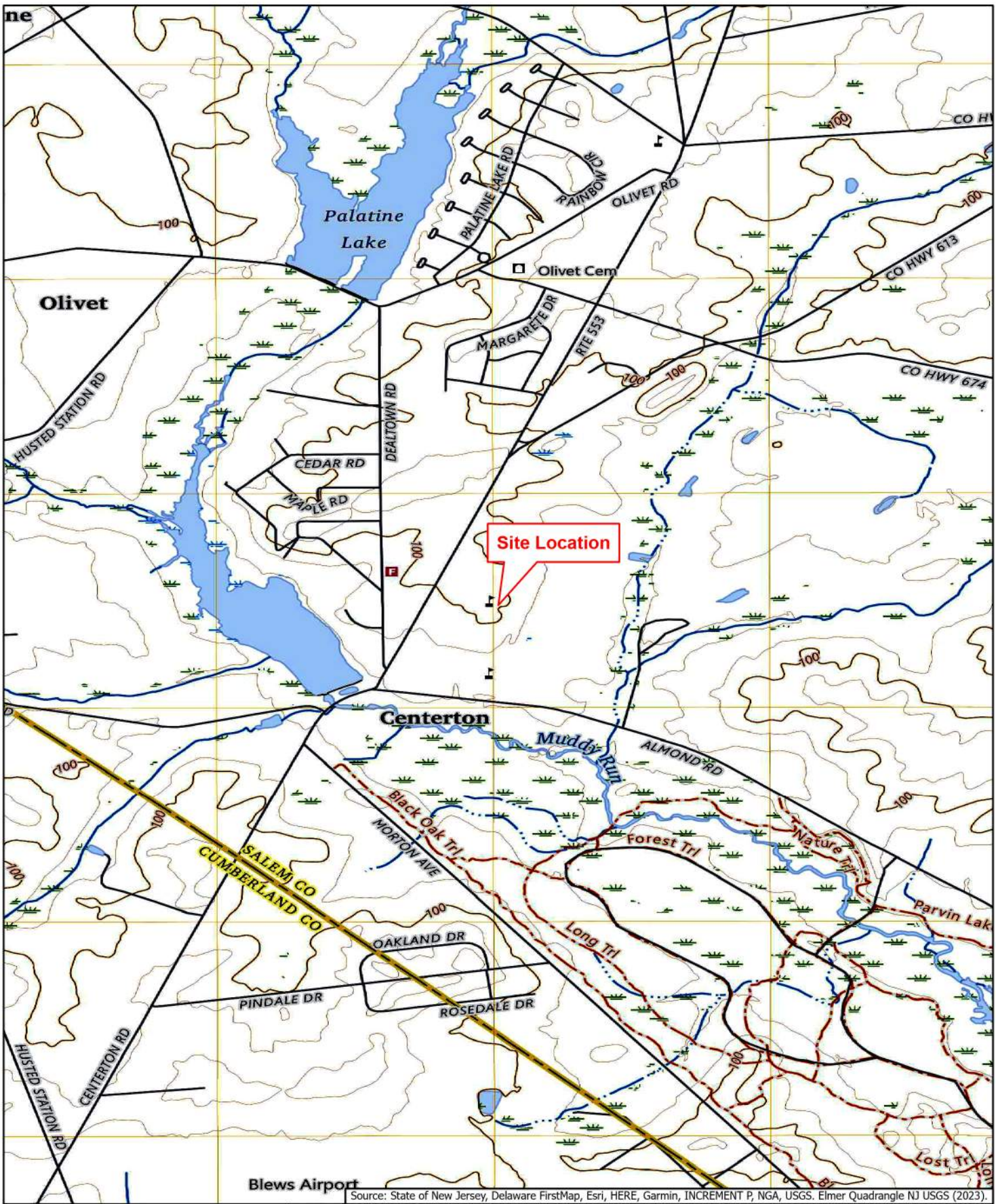
The scope of this geotechnical program did not include investigation or evaluation of any environmental issues, such as wetlands, or hazardous or toxic materials on, below, or in the vicinity of the subject site. Any statements in this report or supporting documentation regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client.

\\corp.collierseng.com\corp\Mays Landing, NJ\Projects\2024\24003905A\Reports\Geotechnical\01-Exploration\GeoRpt-Geotech\Report Docs\240614_RR_GeoRpt-Schalick HS Bleachers & Field House.docx



Engineering
& Design

Figures



Source: State of New Jersey, Delaware FirstMap, Esri, HERE, Garmin, INCREMENT P, NGA, USGS, Elmer Quadrangle NJ USGS (2023).

Prepared For:



Prepared By:

Mays Landing Office
5439 Harding Highway
Mays Landing, NJ 08330
T: 800.258.3787
www.colliersengineering.com





Engineering & Design

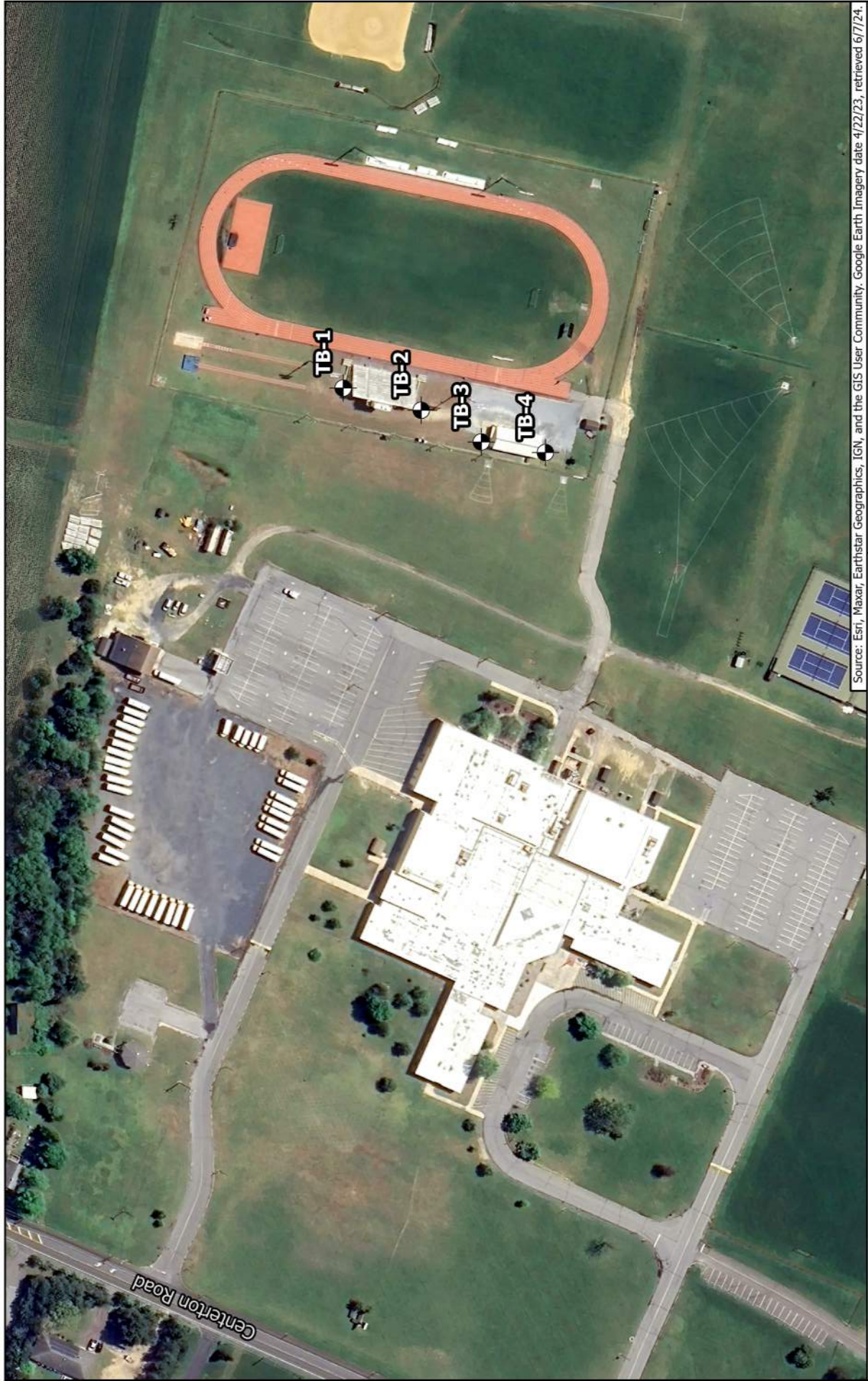
SITE LOCATION MAP

Proposed Bleachers and Field House Schalick High School

PITTSBURGH TOWNSHIP
SALEM COUNTY, NJ 08318

Drawn By: RR	Checked By: EF	Proj. No.: 24003905A
Scale: 1 IN = 2,000 FT	Date: 06/07/2024	Figure No.: 1





Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community. Google Earth Imagery date 4/22/23, retrieved 6/7/24.

LEGEND

INDICATES THE NUMBERS AND APPROXIMATE LOCATIONS OF TEST BORINGS PERFORMED FOR THIS EXPLORATION PROGRAM.



Prepared For:



Prepared By:
Mays Landing Office
5439 Harding Highway
Mays Landing, NJ 08330
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TITLE:

EXPLORATION LOCATION PLAN

PROJECT:

Proposed Bleachers and Field House Schalick High School

PITTSBURGH TOWNSHIP
SALEM COUNTY, NJ 08318

Drawn By: RR

Checked By: EF

Project No.: 24003905A

Scale: 1 IN = 250 FT

Date: 06/07/2024

Figure No.: 2



Engineering
& Design

Appendix A

Test Boring Logs



File: Test Borings - Geotechnical - Structural



Engineering & Design

5439 Harding Highway, Mays Landing, NJ 08330

PROJECT: Proposed Bleachers & Field House -
Schalick HS - Pittsgrove, NJ

LOCATION: (See plan).

PROJECT NO. 24003905A

TEST BORING: TB-2

PAGE 1 OF 1

GROUND ELEVATION (ft): -
ELEV. FROM: Exist. Grade

CONTRACTOR: Soil Borings Drilling, LLC

DRILLER: C. Blemings

DRILLING EQUIPMENT: Mobile Drill B-29

METHOD: HSA ☒ Mud Rotary ☐ Other ☐

HAMMER: CH ☐ Safety ☐ Automatic ☒

RODS: AW ☒ NW ☐ Other ☐

GROUNDWATER: DEPTH (ft) DATE

FIRST ENCOUNTERED 4 5/17/24

END OF DRILLING (0 hrs.)

DATE STARTED 5/17/24

DATE FINISHED 5/17/24

FIELD OBSERVER: R. Recchia

CHECKED BY: R. Pedrick

ASTM D-1586

DEPTH BELOW SURFACE (ft.)	SAMPLE NUMBER	BLOWS PER 6 INCHES				RECOVERY (in)	POCKET PENETROM. (tsf)	MOISTURE (%)	WATER SYMBOL	PROFILE DEPTH ELEV.	IDENTIFICATION OF SOILS / REMARKS
		0-6"	6-12"	12-18"	18-24"						
5	S-1	2	3	4	5	16	1.75			Stratum S/\$C	S-1: $\pm 5"$ Topsoil Tan cmf SAND, trace Silt. (Moist).
	0.0'-2.0'										S-2: Orange cmf SAND, little Silt. (Moist).
	S-2	3	6	6	8	18					S-3: Orange cmf SAND, some Silt & Clay. (Wet).
	2.0'-4.0'										S-4: Same as S-3. (Wet).
10	S-3	8	9	10	11	20					S-5: TOP 10": Same as S-3. (Wet).
	4.0'-6.0'										MID 6": Orange SILTY CLAY, little cmf Sand, trace f Gravel. (Wet).
	S-4	7	6	5	7	20					BOT: Orange cmf SAND, some Silt & Clay. (Wet).
	6.0'-8.0'										S-6: Orange cmf SAND, some Silt & Clay. (Wet).
15	S-5	2	2	5	6	24					S-7: TOP 12": Same as S-6. (Wet).
	8.0'-10.0'										BOT: Orange, Tan SILTY CLAY, and cmf Sand. (Wet).
	S-6	2	4	6	10	24					S-8: TOP 12": Orange, Gray SILTY CLAY, some cmf Sand. (Wet).
	10.0'-12.0'										BOT: Orange cmf SAND, little Silt & Clay, trace f Gravel. (Wet).
20	S-7	3	2	1	3	24					S-9: Orange mf SAND, some Silt & Clay. (Wet).
	13.0'-15.0'										
	S-8	3	7	19	21	24					
	18.0'-20.0'										
25	S-9	6	8	14	17	24					
	23.0'-24.5'										
30											
35											
40											

NOTES: Bentonite slurry added through augers at 8'.

TEST BORING: TB-2

PAGE 1 OF 1



Engineering & Design

5439 Harding Highway, Mays Landing, NJ 08330

PROJECT: Proposed Bleachers & Field House -
Schalick HS - Pittsgrove, NJ

LOCATION: (See plan).

PROJECT NO. 24003905A

TEST BORING: TB-3

PAGE 1 OF 1

GROUND ELEVATION (ft): -
ELEV. FROM: Exist. Grade

CONTRACTOR: Soil Borings Drilling, LLC

DRILLER: C. Blemings

DRILLING EQUIPMENT: Mobile Drill B-29

METHOD: HSA ☒ Mud Rotary ☐ Other ☐

HAMMER: CH ☐ Safety ☐ Automatic ☒

RODS: AW ☒ NW ☐ Other ☐

GROUNDWATER: DEPTH (ft) DATE

FIRST ENCOUNTERED 6 5/17/24

END OF DRILLING (0 hrs.)

DATE STARTED 5/17/24

DATE FINISHED 5/17/24

FIELD OBSERVER: R. Recchia

CHECKED BY: R. Pedrick

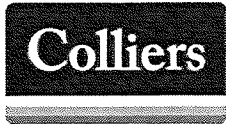
ASTM D-1586

DEPTH BELOW SURFACE (ft.)	SAMPLE NUMBER	BLOWS PER 6 INCHES				RECOVERY (in)	POCKET PENETROM. (lbf)	MOISTURE (%)	WATER SYMBOL	PROFILE	
		0-6"	6-12"	12-18"	18-24"					DEPTH ELEV.	IDENTIFICATION OF SOILS / REMARKS
5	S-1	1	1	4	6	18				Stratum S/\$C	S-1: $\pm 4"$ Topsoil Orange cmf SAND, some mf Gravel, trace Silt. (Moist).
	0.0'-2.0'										
	S-2	6	7	7	6	20					S-2: Brown, Orange cm SAND, some mf Gravel, little(-) Silt & Clay. (Very Moist).
	2.0'-4.0'										
10	S-3	8	9	9	11	24					S-3: Same as S-2. (Very Moist).
	4.0'-6.0'										
	S-4	6	9	11	11	24					S-4: Orange cmf SAND, some(+) Silt & Clay, little mf Gravel. (Wet).
	6.0'-8.0'										
15	S-5	3	6	8	8	20					S-5: Orange cmf SAND, trace Silt. (Wet).
	8.0'-10.0'										
	S-6	2	3	4	4	24					S-6: Orange, Tan cmf SAND, little Silt & Clay, trace f Gravel. (Wet). 1/2" seam of Gray SILTY CLAY.
	10.0'-12.0'										
20	S-7	1	1	WOH	2	20					S-7: Gray, Orange, Tan cm SAND, little Silt & Clay, little(-) mf Gravel. (Wet).
	13.0'-15.0'										
25	S-8	3	5	5	7	24					S-8: Orange, Gray cmf SAND, trace Silt. (Wet). Alternating seams of Gray SILTY CLAY.
	18.0'-20.0'										
30											
35											
40											
										20.0	
										-20.0	END OF TEST BORING AT 20.0 FEET

NOTES: Bentonite slurry added through augers at 8'.

TEST BORING: TB-3

PAGE 1 OF 1



Engineering & Design

5439 Harding Highway, Mays Landing, NJ 08330

PROJECT: Proposed Bleachers & Field House -
Schalick HS - Pittsgrove, NJ

LOCATION: (See plan).

PROJECT NO. 24003905A

TEST BORING: TB-4

PAGE 1 OF 1

GROUND ELEVATION (ft): -
ELEV. FROM: Exist. Grade

CONTRACTOR: Soil Borings Drilling, LLC

DRILLER: C. Blemings

DRILLING EQUIPMENT: Mobile Drill B-29

METHOD: HSA ☒ Mud Rotary ☐ Other ☐


HAMMER: CH ☐ Safety ☐ Automatic ☒

RODS: AW ☒ NW ☐ Other ☐

GROUNDWATER: DEPTH (ft)

DATE

FIRST ENCOUNTERED  6 5/17/24

END OF DRILLING (0 hrs.) 


DATE STARTED 5/17/24

DATE FINISHED 5/17/24

FIELD OBSERVER: R. Recchia

CHECKED BY: R. Pedrick

ASTM D-1586

DEPTH BELOW SURFACE (ft.)	SAMPLE NUMBER	BLOWS PER 6 INCHES				RECOVERY (in)	POCKET PENETROM. (tsf)	MOISTURE (%)	WATER SYMBOL	PROFILE	
		0-6"	6-12"	12-18"	18-24"					DEPTH ELEV.	IDENTIFICATION OF SOILS / REMARKS
5	S-1	5	8	8	7	20	3.0			Stratum S/\$C	S-1: $\pm 3"$ Gravel Cover Brown, Orange cmf SAND, some Silt & Clay, some mf Gravel. (Moist).
	0.0'-2.0'										S-2: Brown, Orange cm SAND, some mf Gravel, little Silt & Clay. (Moist).
	S-2	5	7	7	6	20					S-3: Same as S-2. (Very Moist).
	2.0'-4.0'										S-4: Same as S-2. (Wet).
10	S-3	5	8	11	11	20					S-5: Orange cmf SAND, some Silt & Clay. (Wet).
	4.0'-6.0'										S-6: Orange cmf SAND, little Silt & Clay. (Wet).
	S-4	8	11	11	9	24					S-7: Orange, Tan cmf SAND, little Silt & Clay. (Wet).
	6.0'-8.0'										S-8: TOP 12": Same as S-7. (Wet). BOT: Dk Gray SILTY CLAY, trace mf Sand. (Wet).
15	S-5	5	9	9	11	24					END OF TEST BORING AT 20.0 FEET
	8.0'-10.0'										
	S-6	8	10	15	19	24					
	10.0'-12.0'										
20	S-7	7	8	9	6	24					
	13.0'-15.0'										
25	S-8	3	5	6	7	24					
	18.0'-20.0'										
30											
35											
40											

NOTES: Bentonite slurry added through augers at 8'.

TEST BORING: TB-4

PAGE 1 OF 1



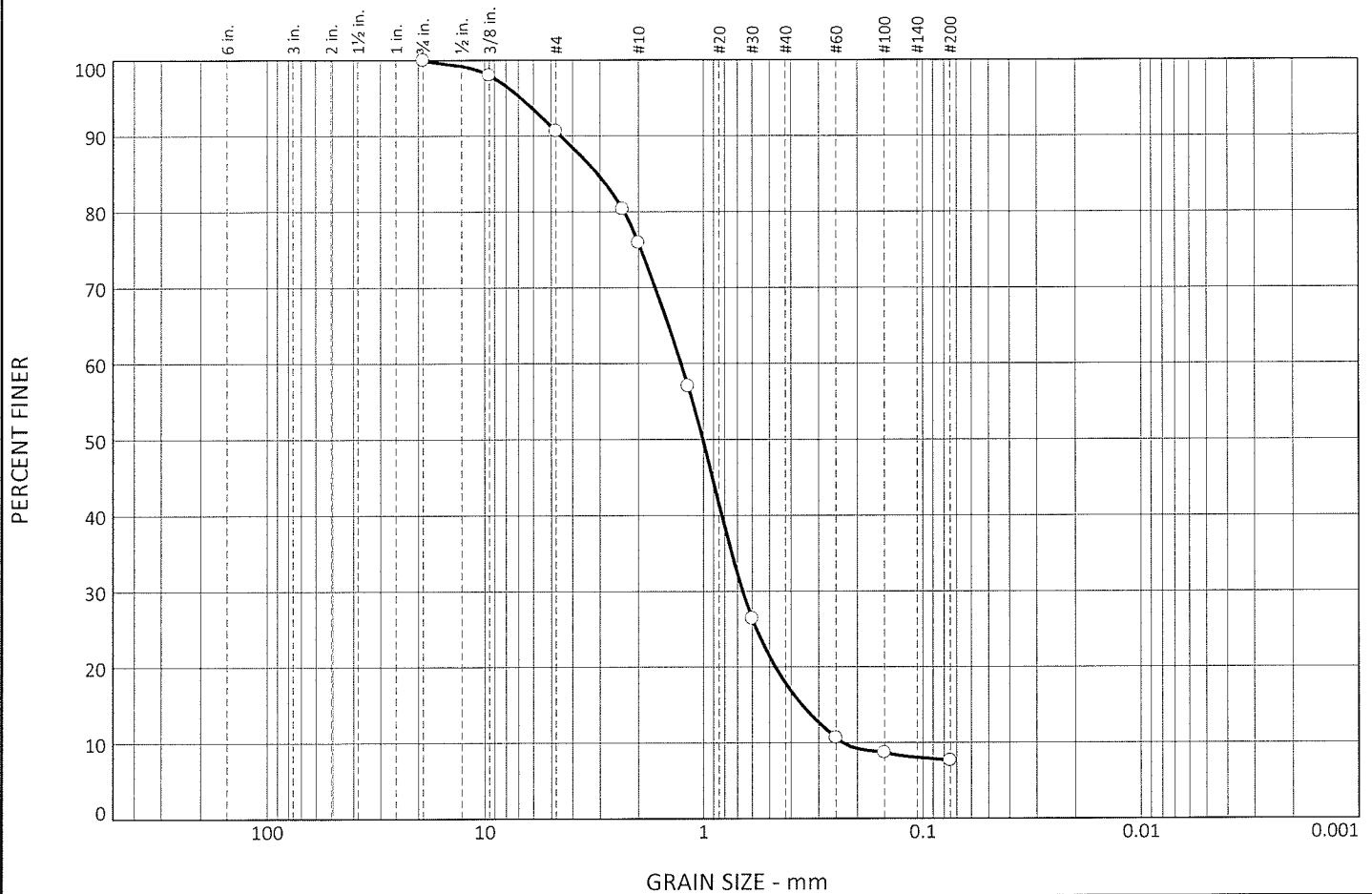
Engineering
& Design

Appendix B

Laboratory Test Results

Comments/Remarks: * See attached Plate(s)

Particle Size Distribution Report



% Cobbles	% Gravel			% Sand			% Fines
	Coarse	Medium	Fine	Coarse	Medium	Fine	
0.0	0.0	2.0	22.1	49.5	15.7	3.0	7.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	98.0		
#4	90.6		
#8	80.4		
#10	75.9		
#16	57.0		
#30	26.4		
#60	10.7		
#100	8.7		
#200	7.7		

* (no specification provided)

Material Description

Tan coarse to medium SAND, some medium to fine Gravel, trace [Fines: (Silt/Clay)]

Atterberg Limits

LL= PL= PI=

Coefficients

D₈₅= 3.0759 D₆₀= 1.2716 D₅₀= 1.0091
D₃₀= 0.6629 D₁₅= 0.3565 D₁₀= 0.2326
C_u= 5.47 C_c= 1.49

Classification

USCS= SP-SM\SC

Remarks

Source of Sample: TB-1 Depth: 8'-10'
Sample Number: S-5

Date: 5/30/24

5439 Harding Highway
Mays Landing New Jersey 08330
Main: 877 627 3772

Geotechnical
Laboratory

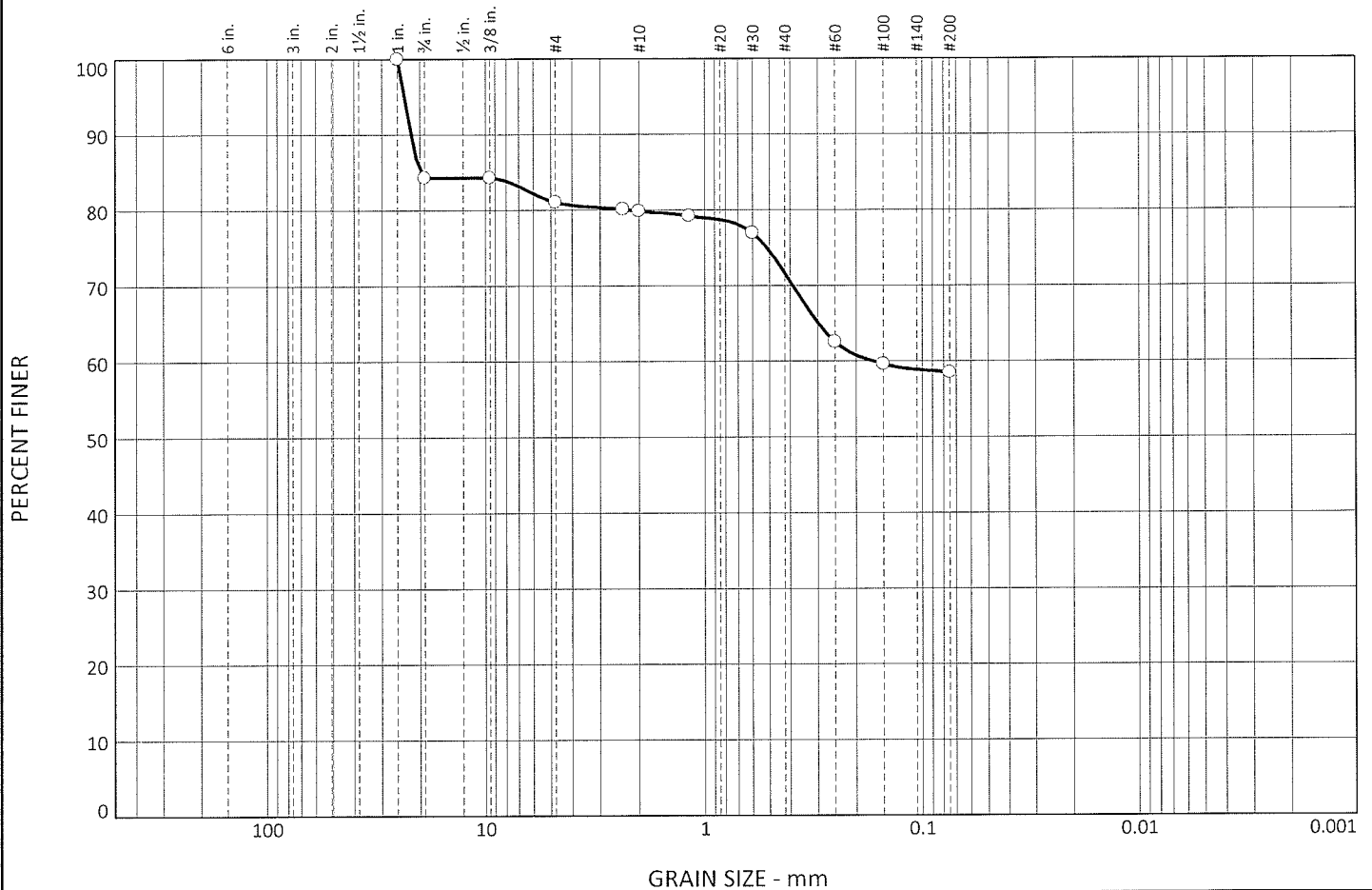


Client: Pittsgrove Township School District
Project: Proposed Bleachers & Field House - Schalick High School
718 Centerton Road - Pittsgrove Township, NJ

Project No: 24003905A

Plate PSA-1

Particle Size Distribution Report



% Cobbles	% Gravel			% Sand			% Fines
	Coarse	Medium	Fine	Coarse	Medium	Fine	
0.0	0.0	15.7	4.4	3.0	14.4	4.0	58.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	84.3		
.375	84.3		
#4	81.0		
#8	80.1		
#10	79.9		
#16	79.2		
#30	76.9		
#60	62.5		
#100	59.6		
#200	58.5		

* (no specification provided)

Material Description		
Orange SILTY CLAY, some coarse to fine Sand, some medium to fine Gravel		
Atterberg Limits		
LL= 53	PL= 25	PI= 28
Coefficients		
D ₈₅ = 19.9300	D ₆₀ = 0.1665	D ₅₀ =
D ₃₀ =	D ₁₅ =	D ₁₀ =
C _u =	C _c =	
Classification		
USCS= CH		
Remarks		
Water Content (WC): 36.7%		

Source of Sample: TB-1 Depth: 14.5'-15'
Sample Number: S-7(BOT)

Date: 5/30/24

5439 Harding Highway
Mays Landing New Jersey 08330
Main: 877 627 3772

Geotechnical
Laboratory

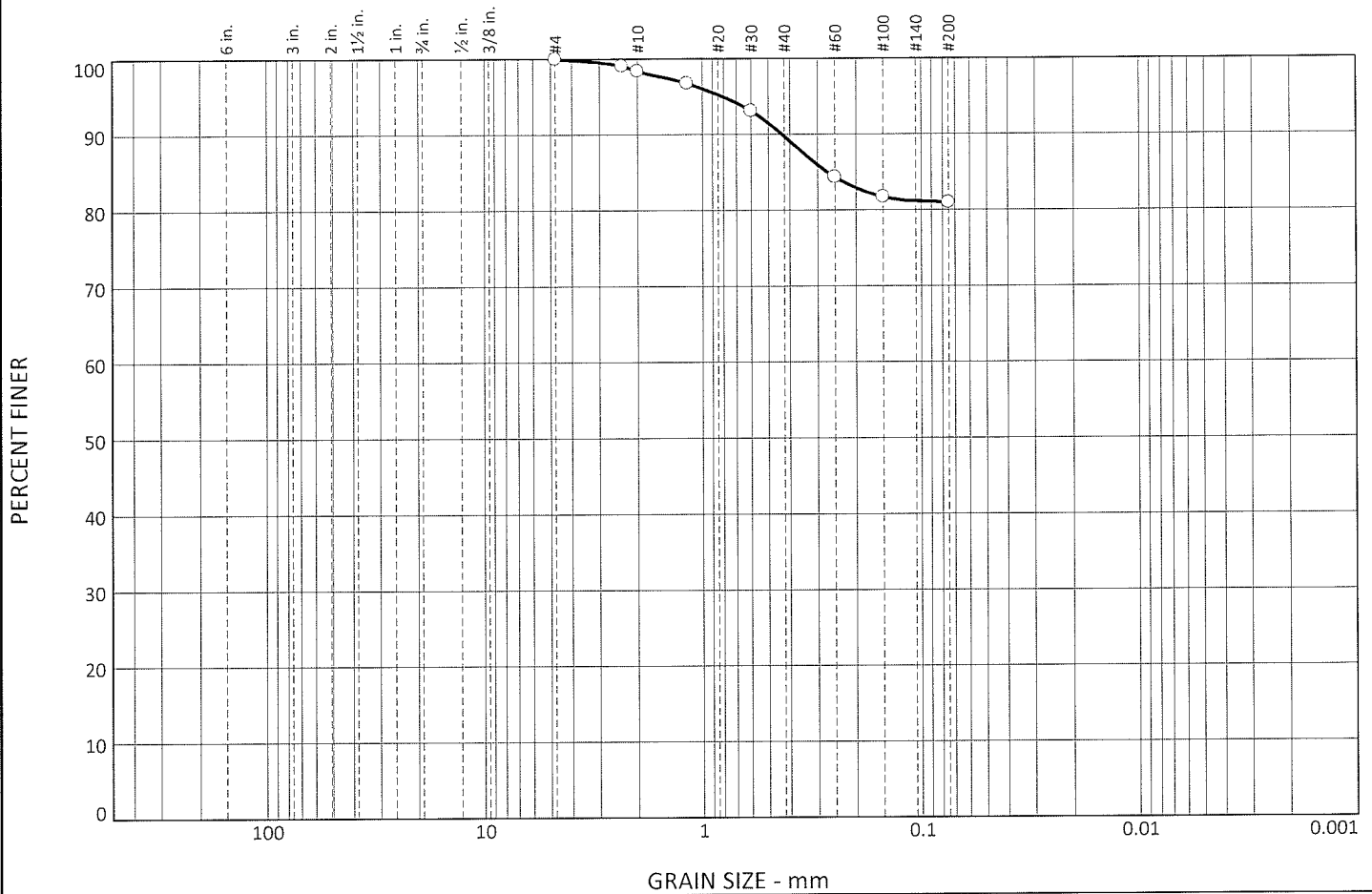


Client: Pittsgrove Township School District
Project: Proposed Bleachers & Field House - Schalick High School
718 Centerton Road - Pittsgrove Township, NJ

Project No: 24003905A

Plate PSA-2

Particle Size Distribution Report



% Cobbles	% Gravel			% Sand			% Fines
	Coarse	Medium	Fine	Coarse	Medium	Fine	
0.0	0.0	0.0	1.6	5.3	8.8	3.3	81.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.1		
#10	98.4		
#16	96.8		
#30	93.1		
#60	84.3		
#100	81.7		
#200	81.0		

* (no specification provided)

Material Description
Orange SILTY CLAY, little coarse to fine Sand, trace fine Gravel

Atterberg Limits
LL= 58 PL= 28 PI= 30

Coefficients
D₈₅= 0.2708 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification
USCS= CH

Remarks
WC: 31.7%

Source of Sample: TB-2 Depth: 9'-9.5'
Sample Number: S-5(MID)

Date: 5/30/24

5439 Harding Highway
Mays Landing New Jersey 08330
Main: 877 627 3772

Geotechnical
Laboratory

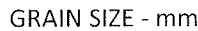


Client: Pittsgrove Township School District
Project: Proposed Bleachers & Field House - Schalick High School
718 Centerton Road - Pittsgrove Township, NJ

Project No: 24003905A

Plate PSA-3

PERCENT FINER

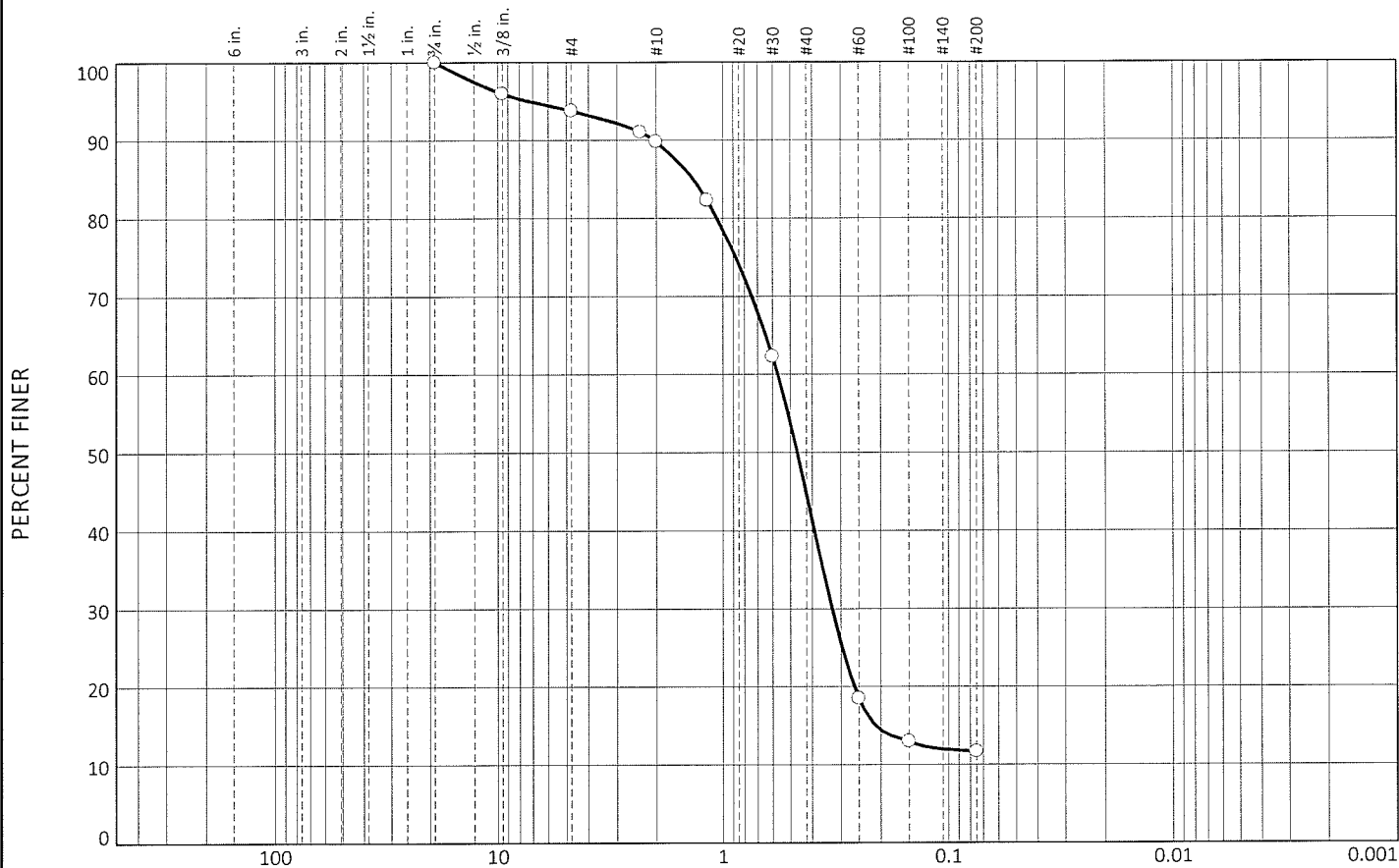


SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	97.7		
#4	89.1		
#8	79.0		
#10	75.6		
#16	62.6		
#30	38.1		
#60	15.9		
#100	12.1		
#200	10.1		

Remarks

Plate PSA-4

Particle Size Distribution Report



% Cobbles	% Gravel			% Sand			% Fines
	Coarse	Medium	Fine	Coarse	Medium	Fine	
0.0	0.0	4.0	6.2	27.5	43.8	6.8	11.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	96.0		
#4	93.8		
#8	91.0		
#10	89.8		
#16	82.3		
#30	62.3		
#60	18.5		
#100	13.0		
#200	11.7		

* (no specification provided)

Material Description

Tan coarse to medium SAND, little [Fines: (Silt/Clay)], little medium to fine Gravel

Atterberg Limits

LL= PL= PI=

Coefficients

D₈₅= 1.3604 D₆₀= 0.5680 D₅₀= 0.4663
D₃₀= 0.3269 D₁₅= 0.2110 D₁₀=
C_u= C_c=

Classification

USCS= SP-SM\SC

Remarks

Source of Sample: TB-3
Sample Number: S-7

Depth: 13'-15'

Date: 5/30/24

5439 Harding Highway
Mays Landing New Jersey 08330
Main: 877 627 3772

Geotechnical
Laboratory



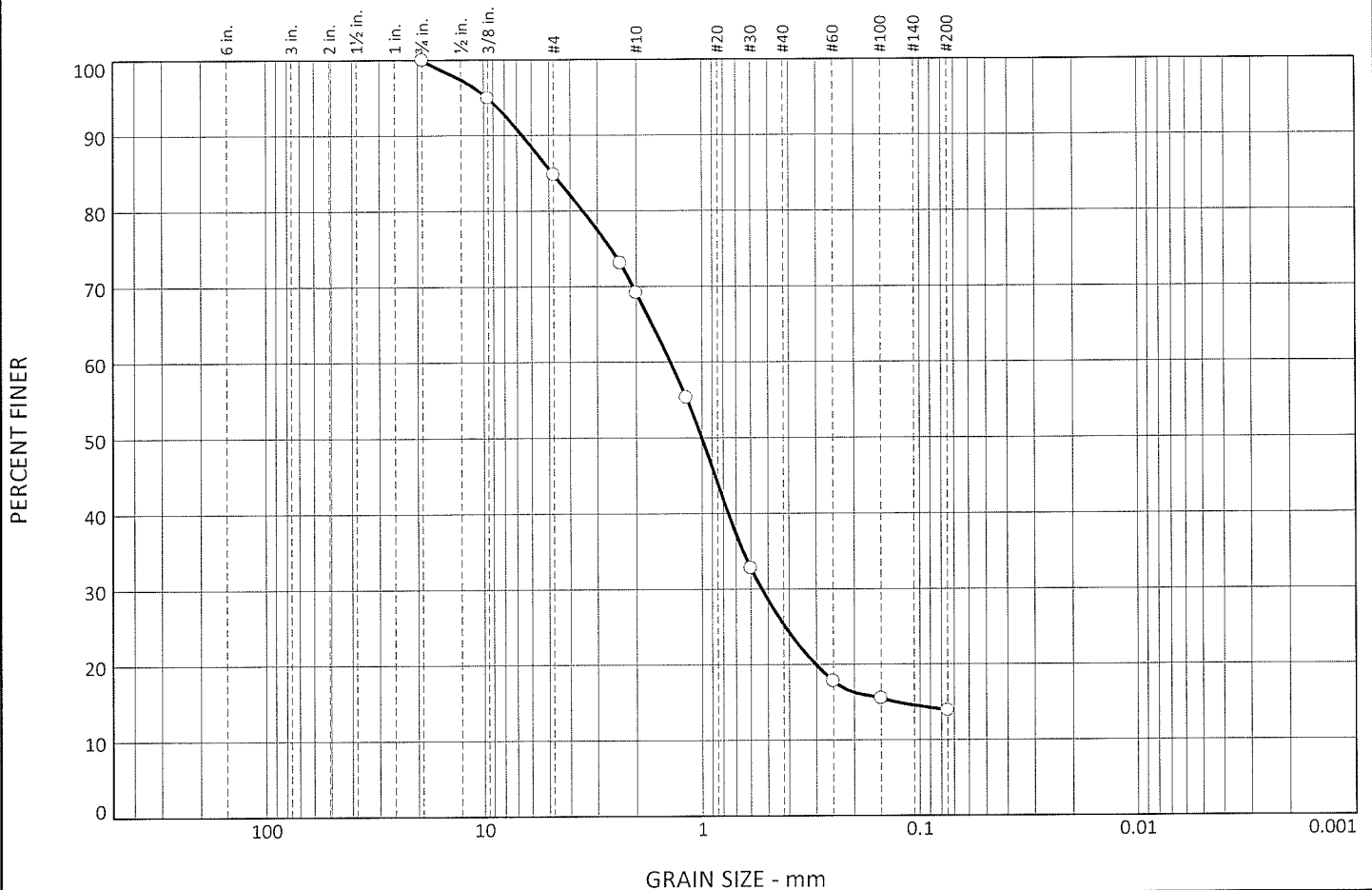
Client: Pittsgrove Township School District

Project: Proposed Bleachers & Field House - Schalick High School
718 Centerton Road - Pittsgrove Township, NJ

Project No: 24003905A

Plate PSA-5

Particle Size Distribution Report



% Cobbles	% Gravel			% Sand			% Fines
	Coarse	Medium	Fine	Coarse	Medium	Fine	
0.0	0.0	5.1	25.7	36.4	15.0	3.9	13.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	94.9		
#4	84.8		
#8	73.1		
#10	69.2		
#16	55.3		
#30	32.8		
#60	17.8		
#100	15.5		
#200	13.9		

* (no specification provided)

Material Description

Brown coarse to medium SAND, some medium to fine Gravel, little [Fines: (Silt/Clay)]

Atterberg Limits

LL= PL= PI=

Coefficients

D₈₅= 4.8218 D₆₀= 1.3936 D₅₀= 1.0033
D₃₀= 0.5342 D₁₅= 0.1260 D₁₀=
C_u= C_c=

Classification

USCS= SM\SC

Remarks

Source of Sample: TB-4
Sample Number: S-4

Depth: 6'-8'

Date: 5/30/24

5439 Harding Highway
Mays Landing New Jersey 08330
Main: 877 627 3772

Geotechnical
Laboratory

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Client: Pittsgrove Township School District

Project: Proposed Bleachers & Field House - Schalick High School
718 Centerton Road - Pittsgrove Township, NJ

Project No: 24003905A

Plate PSA-6



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Appendix C

Seismic Information



Proposed Bleachers and Field House - Schalick HS - Pittsgrove, NJ

718 Centerton Rd, Pittsgrove, NJ 08318, USA

Latitude, Longitude: 39.5288419, -75.1631113



Date	6/7/2024, 9:01:20 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	0.153	MCE_R ground motion. (for 0.2 second period)
S_1	0.044	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.244	Site-modified spectral acceleration value
S_{M1}	0.105	Site-modified spectral acceleration value
S_{DS}	0.163	Numeric seismic design value at 0.2 second SA
S_{D1}	0.07	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	B	Seismic design category
F_a	1.6	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second
PGA	0.082	MCE_G peak ground acceleration
F_{PGA}	1.6	Site amplification factor at PGA
PGA_M	0.131	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
$SsRT$	0.153	Probabilistic risk-targeted ground motion. (0.2 second)
$SsUH$	0.162	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
$S1RT$	0.044	Probabilistic risk-targeted ground motion. (1.0 second)
$S1UH$	0.047	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
$S1D$	0.6	Factored deterministic acceleration value. (1.0 second)
$PGAd$	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	0.082	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.945	Mapped value of the risk coefficient at short periods
C_{R1}	0.933	Mapped value of the risk coefficient at a period of 1 s
C_v	0.7	Vertical coefficient



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Infrastructure • Geotechnical/Environmental • Telecommunications • Utilities/Energy*

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SECTION 02110 – SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Removing above- and below-grade site improvements.
 - 2. Disconnecting, capping, or sealing, and removing site utilities.
 - 3. Temporary erosion and sedimentation control measures.

1.2 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

1.3 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.4 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
- B. Record drawings, according to Division 01 Section "Project Record Documents," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.5 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 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 and authorities having jurisdiction.

SECTION 02110 – SITE CLEARING

2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- E. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Section "Earthwork."
 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. 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 EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary 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 a Soil Erosion and Sediment Control Plan.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

SECTION 02110 – SITE CLEARING

- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
- C. 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 Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.
- E. Removal of underground utilities is included in Division 1 Section.

3.4 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
 - 2. Do not stockpile topsoil within tree protection zones.
 - 3. Dispose of excess topsoil as specified for waste material disposal.
 - 4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.5 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

SECTION 02110 – SITE CLEARING

- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.6 DISPOSAL

- A. Disposal: 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.
 - 1. 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.

END OF SECTION

SECTION 02200 - EARTHWORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Preparing and grading for foundations, slabs-on-grade, walks, pavements, & landscaping.
 - 2. Excavating and backfilling for building and landscape structures.
 - 3. Excavating and backfilling for underground utilities, drainage and appurtenances.
 - 4. Subbase and base course for walks and pavements.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Section 02110 - Site Clearing: For site stripping, grubbing, topsoil removal, and tree protection.
 - 2. Geotechnical Engineering Report

1.3 DEFINITIONS

- A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.
- B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.
- D. Subbase Course: The layer placed between the subgrade and base course in a paving system or the layer placed between the subgrade and surface of a pavement or walk.
- E. Base Course: The layer placed between the subbase and surface pavement in a paving system.
- F. Drainage Fill: Course of washed granular material supporting slab-on-grade placed to
- G. cut off upward capillary flow of pore water.
- H. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense.

SECTION 02200 - EARTHWORK

- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.
- J. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

1.4 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for the following: (Not Applicable)
- C. Samples of the following:
 - 1. 20 lb (9 kg) samples, sealed in air-tight containers, of each proposed fill and backfill soil material from on-site or borrow sources.
- D. Test Reports: In addition to test reports required under field quality control, submit the following:
 - 1. Laboratory analysis of each soil material proposed for fill and backfill from on-site and borrow sources.
 - 2. One optimum moisture-maximum density curve for each soil material.
 - 3. Report of actual unconfined compressive strength and/or results of bearing testsof each stratum tested.
- E. Photographs of existing adjacent structures and site improvements.

1.5 QUALITY ASSURANCE

- A. Codes and Standards: Perform earthwork complying with requirements of authoritieshaving jurisdiction.
- B. Comply with applicable requirements of NFPA 495--Explosive Materials Code.
- C. Testing and Inspection Service: The Contractor will have a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow soils toverify that soils comply with specified requirements and to perform required field and laboratory testing.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 - General Requirements: Project Meetings.
 - 1. Before commencing earthwork, meet with representatives of the governing authorities, Owner, Architect, consultants, Geotechnical Engineer, independent testing agency, and other concerned entities. Review earthwork procedures andresponsibilities including testing and inspection procedures and requirements.

Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.

SECTION 02200 - EARTHWORK

1.6 PROJECT CONDITIONS

- A. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.
- B. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks, and record existing elevations

PART 2 PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.
- B. Satisfactory Soil Materials: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 2 inches (50 mm) in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.
- C. Unsatisfactory Soil Materials: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.
- D. Base Material under building slabs-on-grade: Dense graded aggregate base of crushed stone or gravel with no more than 10% passing through a #4 sieve.
- E. Other Subbase and Base Material: Dense graded aggregate base course or soil aggregate base course. Designation I-5 conforming to NJDOT specifications.
- F. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, coarse aggregate grading size 57, with 100 percent passing a 1-1/2 inch (38 mm) sieve and not more than 5 percent passing a No. 8 (2.36mm) sieve.
- G. Filtering Material: Evenly graded mixture of natural or crushed gravel or crushed stone and natural sand, with 100 percent passing a 1-1/2 inch (38 mm) sieve and not more than 5 percent passing a No. 50 (300 micrometer) sieve.
- H. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility.
- B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide

SECTION 02200 - EARTHWORK

and 4 mils (0.1 mm) thick minimum, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep.

1. Tape Colors: Provide tape colors to utilities as follows:
 - a. Red: Electric.
 - b. Yellow: Gas, oil, steam, and dangerous materials.
 - c. Orange: Telephone and other communications.
 - d. Blue: Water systems.
 - e. Green: Sewer systems.
- C. Filter Fabric: Manufacturer's standard nonwoven pervious geotextile fabric of polypropylene, nylon or polyester fibers, or a combination.
 1. Provide filter fabrics that meet or exceed the listed minimum physical properties determined according to ASTM D 4759 and the referenced standard test method in parentheses:
 - a. Grab Tensile Strength (ASTM D 4632): 100 lb (45 kg).
 - b. Apparent Opening Size (ASTM D 4751): #100 U.S. Standard (150 micrometer) sieve.
 - c. Permeability (ASTM D 4491): 150 gallons per minute per sq. ft. (102 L/s per sq. m).

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 earthwork operations.
- B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- C. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- D. Tree protection is specified in the Division 2 Section "Site Clearing."

3.2 DEWATERING

- A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

SECTION 02200 - EARTHWORK

3.3 EXCAVATION

- A. Explosives: Do not use explosives.
- B. Unclassified Excavation: Excavation is unclassified and includes excavation to required subgrade elevations regardless of the character of materials and obstructions encountered.

3.4 STABILITY OF EXCAVATIONS

- A. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.6 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated slopes, lines, depths, and invert elevations.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300mm) higher than top of pipe or conduit, unless otherwise indicated.
 - 1. Clearance: 12 inches (300 mm) 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 stones and sharp objects to avoid point loading.
 - 1. For pipes or conduit less than 6 inches (150 mm) in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 - 2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
 - 3. Where encountering rock or another unyielding bearing surface, carry trench excavation 6 inches (150 mm) below invert elevation to receive bedding course.

3.7 APPROVAL OF SUBGRADE

- A. Notify Architect, Engineer and Testing Agency when excavations have reached required subgrade.

SECTION 02200 - EARTHWORK

- B. When testing agency determines that unforeseen unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
 - 1. Unforeseen additional excavation and replacement material will be paid according to the Contract provisions for over excavation allowance Item B.
- C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.

3.8 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position when acceptable to the Architect.
 - 1. Fill unauthorized excavations under other construction as directed by the Architect.
- B. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Architect.

3.9 STORAGE OF SOIL MATERIALS

- A. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within dripline of remaining trees.

3.10 BACKFILL

- A. Backfill excavations promptly, but not before completing the following:
 - 1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for record documents.
 - 3. Testing, inspecting, and approval of underground utilities.
 - 4. Concrete formwork removal.
 - 5. Removal of trash and debris from excavation.
 - 6. Removal of temporary shoring and bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.11 UTILITY TRENCH BACKFILL

- A. Place and compact bedding course on rock and other unyielding bearing surfaces and to fill unauthorized excavations. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

SECTION 02200 - EARTHWORK

- B. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch (25 mm), to a height of 12 inches (300 mm) over the utility pipe or conduit.
 - 1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
- C. Coordinate backfilling with utilities testing.
- D. Fill voids with approved backfill materials as shoring and bracing, and sheeting is removed.
- E. Place and compact final backfill of satisfactory soil material to final subgrade.
- F. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.12 FILL

- A. Fill in accordance with the Geotechnical Report.
- B. Preparation: Remove vegetation, topsoil, debris, wet, and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.
 - 1. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.
- C. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture-condition or aerate soil and recompact to required density.
- D. Place fill material in layers to required elevations for each location listed below.
 - 1. Under grass, use satisfactory excavated or borrow soil material.
 - 2. Under walks and pavements, use subbase or base material, or satisfactory excavated or borrow soil material.
 - 3. Under steps and ramps, use subbase material.
 - 4. Under building slabs, use drainage fill material.
 - 5. Under footings and foundations, use engineered fill.

3.13 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

SECTION 02200 - EARTHWORK

2. Remove and replace, or scarify and air-dry satisfactory soil material that is too wet to compact to specified density.
 - a. Stockpile or spread and dry removed wet satisfactory soil material.

3.14 COMPACTION

- A. Place backfill and fill materials in layers in strict accordance with the Geotechnical Report.

3.15 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between existing adjacent grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 1. Lawn or Unpaved Areas: Plus or minus 1.2 inches.
 2. Walks: Plus or minus 1.2 inches.
 3. Pavements: Plus or minus 1/2 inch.
- C. Grading Inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10 foot straightedge.

3.16 SUBBASE AND BASE COURSES

- A. Pavements and Walks: Place subbase course material on prepared subgrades. Place base course material over subbases.
 1. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections and thickness to not less than 95 percent of ASTM D4254 relative density.
 2. Shape subbase and base to required crown elevations and cross-slope grades.
 3. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
 4. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.
- B. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders at least 12 inches wide of acceptable soil materials and compact simultaneously with each subbase and base layer.

SECTION 02200 - EARTHWORK

3.17 FIELD QUALITY CONTROL

- A. Testing Agency Services: Owner will engage a testing agency to inspect Earthwork. Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.

3.18 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace material to depth directed by the Architect; reshape and recompact at optimum moisture content to the required density.
- C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Transport surplus satisfactory soil to designated storage areas on the Owner's property. Stockpile or spread soil as directed by Architect.
 - 1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION

SECTION 02511 – HOT MIX ASPHALT PAVING

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. Hot-mix asphalt paving.
 - 2. Hot-mix asphalt patching.
 - 3. Hot-mix asphalt overlays.
 - 4. Asphalt surface treatments:
 - a. Fog seals.
 - b. Slurries.
 - 5. Pavement-marking paint.
 - 6. Wheel stops.
- B. Related Sections include the following:
 - 1. Section "Earthwork" for aggregate subbase and base courses and aggregate pavement shoulders.

1.3 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt pavement according to the materials, workmanship, and other applicable requirements of the standard specifications of the New Jersey Department of Transportation.
 - 1. Standard Specification: As indicated.
 - 2. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.4 SUBMITTALS

- A. Product Data: For each product specified. Include technical data and tested physical and performance properties.
- B. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
- C. Job-Mix Designs: For each job mix proposed for the Work.
- D. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate dedicated handicapped spaces with international graphics symbol.

SECTION 02511 – HOT MIX ASPHALT PAVING

- E. 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.
- F. Material Test Reports: Indicate and interpret test results for compliance of materials with requirements indicated.
- G. Material Certificates: Certificates signed by manufacturers certifying that each material complies with requirements.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Manufacturer Qualifications: Engage a firm experienced in manufacturing hot-mix asphalt similar to that indicated for this Project and with a record of successful in-service performance.
 - 1. Firm shall be a registered and approved paving mix manufacturer with authorities having jurisdiction or with the DOT of the state in which Project is located.
- C. Testing Agency Qualifications: Demonstrate to Architect's satisfaction, based on Architect's evaluation of criteria conforming to ASTM D 3666, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- D. Regulatory Requirements: Conform to applicable standards of authorities having jurisdiction for asphalt paving work on public property.
- E. Asphalt-Paving Publication: Comply with AI's "The Asphalt Handbook," except where more stringent requirements are indicated.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings" Review methods and procedures related to asphalt paving including, but not limited to, the following:
 - 1. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - 2. Review condition of substrate and preparatory work performed by other trades.
 - 3. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
 - 4. Review and finalize construction schedule for paving and related work. Verify availability of materials, paving Installer's personnel, and equipment required to execute the Work without delays.
 - 5. Review inspection and testing requirements, governing regulations, and proposed installation procedures.
 - 6. Review forecasted weather conditions and procedures for coping with unfavorable conditions.

SECTION 02511 – HOT MIX ASPHALT PAVING

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location and within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:
 - 1. Prime and Tack Coats: Minimum surface temperature of 60 deg F (15.5 deg C).
 - 2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
 - 3. Asphalt Base Course: Minimum surface temperature of 40 deg F (4 deg C) and rising at time of placement.
 - 4. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.5 deg C) at time of placement.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F (4 deg C) for oil-based materials, 50 deg F (10 deg C) for water-based materials, and not exceeding 95 deg F (35 deg C).

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: Sound; angular crushed stone; crushed gravel; or properly cured, crushed blast-furnace slag; complying with ASTM D 692.
- C. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone; gravel, properly cured blast-furnace slag, or combinations thereof; complying with ASTM D 1073.
 - 1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
- D. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with ASTM D 242.

2.2 ASPHALT MATERIALS

- A. Asphalt Cement: ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.
- B. Asphalt Cement: ASTM D 3381 for viscosity-graded material.

SECTION 02511 – HOT MIX ASPHALT PAVING

- C. Undersealing Asphalt: ASTM D 3141, pumping consistency.
- D. Prime Coat: ASTM D 2027; medium-curing cutback asphalt; MC-30, MC-70, or MC-250.
- E. Prime Coat: Asphalt emulsion prime conforming to state DOT requirements.
- F. Prime Coat: ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.
- G. Tack Coat: ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.
- H. Fog Seal: ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.
- I. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Sand: ASTM D 1073, Grade Nos. 2 or 3.
- B. Pavement-Marking Paint: Alkyd-resin type, ready-mixed, complying with FS TT-P-115, Type I, or AASHTO M-248, Type N.
- C. Pavement-Marking Paint: Latex, water-base emulsion, ready-mixed, complying with FS TT-P-1952.
 - 1. Color: As indicated.
- D. Glass Beads: AASHTO M-247.
- E. Wheel Stops: Precast, air-entrained concrete, 2500-psi (17.2-MPa) minimum compressive strength, approximately 5 inches (125 mm) high, 9 inches (225 mm) wide, and 72 inches (1825 mm) long. Provide chamfered corners and drainage slots on underside, and provide holes for anchoring to substrate.
 - 1. Dowels: Galvanized steel, diameter 5/8 inch (16 mm), minimum length 24 inches (610 mm).

2.4 MIXES

- A. Hot-Mix Asphalt: Provide dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI's "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
 - 2. Base Course: As indicated.
 - 3. Surface Course: As indicated.

SECTION 02511 – HOT MIX ASPHALT PAVING

- B. Hot-Mix Asphalt: Provide dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and designed according to procedures in AI's "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types."
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
 - 2. Provide mixes complying with the composition, grading, and tolerance requirements of ASTM D 3515 for the following nominal, maximum aggregate sizes:
 - a. Base Course: 1 inch (25 mm).
 - b. Surface Course: 1/2 inch (13 mm).
- C. Emulsified-Asphalt Slurry: ASTM D 3910, consisting of emulsified asphalt, fine aggregates, and mineral fillers and as follows:
 - 1. Composition: Type 1.
 - 2. Composition: Type 2.
 - 3. Composition: Type 3.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
- B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
- C. Notify Architect in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily corrected.

3.2 COLD MILLING

- A. Clean existing paving surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement, including hot-mix asphalt and, as necessary, unbound-aggregate base course, by cold milling to grades and cross sections indicated.
 - 1. Repair or replace curbs, manholes, and other construction damaged during cold milling.

3.3 PATCHING AND REPAIRS

- A. Patching: Saw cut perimeter of patch and excavate existing pavement section to sound base. Recompact new subgrade. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically.
 - 1. Tack coat faces of excavation and allow to cure before paving.
 - 2. Fill excavation with dense-graded, hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.

SECTION 02511 – HOT MIX ASPHALT PAVING

3. Partially fill excavation with dense-graded, hot-mix asphalt base mix and compact while still hot. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.
- B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseal concrete pieces firmly.
 1. Pump hot undersealing asphalt under rocking slabs until slab is stabilized or, if necessary, crack slab into pieces and roll to reseal pieces firmly.
 2. Remove disintegrated or badly broken pavement. Prepare and patch with hot-mix asphalt.
- C. Leveling Course: Install and compact leveling course consisting of dense-graded, hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.
 1. Install leveling wedges in compacted lifts not exceeding 3 inches (75 mm) thick.
- D. Crack and Joint Filling: Remove existing filler material from cracks or joints to a depth of 1/4 inch (6 mm). Refill with asphalt joint-filling material to restore watertight condition. Remove excess filler that has accumulated near cracks or joints.
- E. Tack Coat: Apply uniformly to existing surfaces of previously constructed asphalt or portland cement concrete paving and to surfaces abutting or projecting into new, hot-mix asphalt pavement. Apply at a uniform rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m) of surface.
 1. Allow tack coat to cure undisturbed before paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.4 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.
 1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

3.5 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt mix 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. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 2. Place hot-mix asphalt surface course in single lift.
 3. Spread mix at minimum temperature of 250 deg F (121 deg C).
 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.

SECTION 02511 – HOT MIX ASPHALT PAVING

5. 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 (3 m) wide, except where infill edge strips of a lesser width are required.
 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete asphalt base course for a section before placing asphalt surface course.
- 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.

3.6 JOINTS

- A. Construct joints to ensure 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.
 2. Offset longitudinal joints in successive courses a minimum of 6 inches (150 mm).
 3. Offset transverse joints in successive courses a minimum of 24 inches (600 mm).
 4. Construct transverse joints by bulkhead method or sawed vertical face method as described in AI's "The Asphalt Handbook."
 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 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 vibratory-plate compactors in areas inaccessible to rollers.
 1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).
- B. Breakdown Rolling: Accomplish breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Repair surfaces by loosening displaced material, filling with hot-mix asphalt, and rerolling to required elevations.
- 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: 96 percent of reference laboratory density according to ASTM D 1559, but not less than 94 percent nor greater than 100 percent.
 2. 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.

SECTION 02511 – HOT MIX ASPHALT PAVING

- 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 still hot, with back of rake or smooth iron. Compact thoroughly using tamper or other satisfactory method.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials. Remove paving course over area affected and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

- A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus 1/2 inch (13 mm).
 - 2. Surface Course: Plus 1/4 inch (6 mm), no minus.
- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch (6 mm).
 - 2. Surface Course: 1/8 inch (3 mm).
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

3.9 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Construction Manager.
- B. Allow paving to cure for 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 (0.4 mm).
 - 1. Broadcast glass spheres uniformly into wet pavement markings at a rate of 6 lb/gal. (0.72 kg/L).

SECTION 02511 – HOT MIX ASPHALT PAVING

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified independent testing 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 specified requirements.
- B. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Samples of uncompacted paving mixtures and compacted pavement will be secured by testing agency according to ASTM D 979.
 - 1. Reference laboratory density will be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 1559, and compacted according to job-mix specifications.
 - 2. Reference maximum theoretical density will be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
 - 3. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a. One core sample will be taken for every 1000 sq. yd. (836 sq. m) or less of installed pavement, but in no case will fewer than 3 cores be taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION 02511

SECTION 02700 – SEWERAGE AND DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes sewerage and drainage systems outside the building. Systems include the following:
 - 1. Sanitary sewerage.
 - 2. Storm drainage.
 - 3. Force Main.
 - 4. Duplex Grinder Pump Station.
 - 5. Duplex Control Panel.
 - 6. Installation, start-up, and testing of all equipment.

1.3 DEFINITIONS

- A. Sewerage Piping: System of sewer pipes, fittings, and appurtenances for gravity flow of sanitary sewage.
- B. Drainage Piping: System of sewer pipe, fittings, and appurtenances for gravity flow of storm drainage.
- C. Force-Main Piping: System of pipe, fittings, and appurtenances for pumped flow of sanitary sewage.

1.4 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.
- B. Force Main, Pressure Ratings: At least equal to system operating pressure, but not less than 150 psig (1035 kPa).

1.5 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 the following:
 - 1. Storm drainage piping.
 - 2. Sanitary sewer piping.
 - 3. Force main.
- C. Shop drawings for precast concrete manholes and other structures. Include frames, covers, and grates.
- D. Shop drawings for cast-in-place concrete or field-erected masonry manholes and other structures. Include frames, covers, and grates.

SECTION 02700 – SEWERAGE AND DRAINAGE

- E. Reports and calculations for design mixes for each class of cast-in-place concrete.
- F. Coordination drawings showing manholes and other structures, pipe sizes, locations, and elevations. Include details of underground structures and connections. Show other piping in same trench and clearances from sewerage system piping. Indicate interface and spatial relationship between piping and proximate structures.
- G. Inspection and test reports specified in the "Field Quality Control" Article.
- H. Pump Station Materials List: Submit copies of a complete list of all materials and equipment proposed to be furnished and installed under this portion of work, giving manufacturer's name, catalog number and catalog cut for each item where applicable.
- I. Pump Station Manufacturer's Recommendations: Accompanying the materials list, submit copies of the manufacturer's current recommended method of installation for materials provided.
- J. Pump Station: Certification that equipment provided is in accordance with design parameters.
- K. Pump Station: Copies of a complete wiring diagram and elementary diagram conductor and terminal identification as installed. In addition, a copy of wiring diagram shall be secured to the inside door/placed in door pocket of control panel enclosure.

1.6 QUALITY ASSURANCE

- A. Environmental Agency Compliance: Comply with regulations pertaining to sanitary sewerage and storm drainage systems.
- B. Utility Compliance: Comply with regulations pertaining to sanitary sewerage and storm drainage systems. Include standards of water and other utilities where appropriate.
- C. Product Options: Drawings indicate sizes, profiles, connections, and dimensional requirements of system components and are based on specific manufacturer types indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Specification Section 01300-Submittals.."
- D. Qualification of Manufacturer: Products used in the work of this section shall be produced by manufactures regularly engaged in the manufacture of similar items and with a history of successful production acceptable to the engineer.
- E. Qualification of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods need for proper performance of the work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic structures in direct sunlight.
- B. Do not store plastic pipe or fittings in direct sunlight.

SECTION 02700 – SEWERAGE AND DRAINAGE

- C. Protect pipe, pipe fittings, and seals from dirt and damage.
- D. Handle precast concrete manholes and other structures according to manufacturer's rigging instructions.
- E. Protection: Use all means necessary to protect the materials of this section before, during and after installation and to protect the installed work and materials of all other trades.
- F. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the engineer and at no additional cost to the Owner.
- G. Deliver materials in manufacturer's original packaging with all tags and labels intact and legible.
- H. Store and handle material in such a manner as to avoid damage, store at site undercover.

1.8 PROJECT CONDITIONS

- A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.
- B. Locate existing structures and piping to be closed and abandoned.
- C. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted under the following conditions and then only after arranging to provide acceptable temporary utility services.
 - 1. Notify Architect not less than 48 hours in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without receiving Architect's written permission.

1.9 SEQUENCING AND SCHEDULING

- A. Coordinate sanitary sewerage system connections to utility company's sanitary sewer.
- B. Coordinate with interior building drainage systems.
- C. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

- A. Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: ASTM D 3034, SDR 35, for solvent-cemented or gasketed joints.
 - 1. Primer: ASTM F 656.
 - 2. Solvent Cement: ASTM D 2564.
 - 3. Gaskets: ASTM F 477, elastomeric seal.

SECTION 02700 – SEWERAGE AND DRAINAGE

- B. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76 (ASTM C 76M), Class III, Wall B, for gasketed joints.

- 1. Gaskets: ASTM C 443 (ASTM C 443M), rubber.

2.2 MANHOLES

- A. Precast Concrete Manholes: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for rubber gasket joints.

- 1. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent floatation.
 - 2. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (100-mm) minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.
 - 3. Riser Sections: 4-inch (100-mm) minimum thickness, 48-inch (1220-mm) 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. Gaskets: ASTM C 443 (ASTM C 443M), rubber.
 - 6. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch (152- to 229-mm) total thickness, that match a 24-inch- (610-mm-) diameter frame and cover.
 - 7. Steps: Fiber glass, individual steps or ladder. Include a width that allows a worker to place both feet on one step and is designed to prevent lateral slippage off the step. Cast steps or anchor ladder into base, riser, and top section sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps for manholes less than 60 inches (1500 mm) deep.
 - 8. Steps: ASTM C 478 (ASTM C 478M) individual steps or ladder. Omit steps for manholes less than 60 inches (1500 mm) deep.
 - 9. Pipe Connectors: ASTM C 923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.

- B. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, heavy-duty ductile iron. Include 24-inch (610-mm) inside diameter by 7- to 9-inch (178- to 229-mm) riser with 4-inch (100-mm) minimum width flange, and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering, equivalent to the following, cast into cover:

- 1. Sanitary Sewerage Piping Systems: SANITARY SEWER.
 - 2. Storm Drainage Piping Systems: STORM SEWER.
 - 3. Piping Systems Containing Sanitary Sewage: SANITARY SEWER.

2.3 CATCH BASINS

- A. Precast Concrete Catch Basins: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for rubber gasket joints.

- 1. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (100-mm) minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.
 - 2. Riser Sections: 4-inch (100-mm) minimum thickness; 48-inch (1220-mm) diameter, and lengths to provide depth indicated.

SECTION 02700 – SEWERAGE AND DRAINAGE

3. Top Section: Eccentric cone type, unless concentric cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
4. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch (152- to 229-mm) total thickness, that match a 24-inch- (610-mm-) diameter frame and grate.
5. Steps: Fiber glass, individual steps or ladder. Include a width that allows a worker to place both feet on one step and is designed to prevent lateral slippage off the step. Cast steps or anchor ladder into base, riser, and top section sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps for catch basins less than 60 inches (1500 mm) deep.
6. Steps: ASTM C 478 (ASTM C 478M) individual steps or ladder. Omit steps for catch basins less than 60 inches (1500 mm) deep.
7. Pipe Connectors: ASTM C 923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.

B. Brick Catch Basins: Brick and mortar, of depth, shape, and dimensions indicated.

1. Base, Channel, and Bench: Concrete.
2. Wall: ASTM C 32, Grade MS, manhole brick; 8-inch (200-mm) minimum thickness with tapered top for a 24-inch (610-mm) frame and cover.
 - a. Option: ASTM C 139, concrete masonry units may be used instead of brick.
3. Mortar: ASTM C 270, Type S, using ASTM C 150, Type II, portland cement.
4. Steps: Fiber glass, individual steps or ladder. Include a width that allows a worker to place both feet on one step and is designed to prevent lateral slippage off the step. Cast steps or anchor ladder into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps for catch basins less than 60 inches (1500 mm) deep.

C. Frames and Grates: ASTM A 536, Grade 60-40-18, heavy-duty ductile iron, 24-inch (610-mm) inside diameter by 7- to 9-inch (178- to 229-mm) riser with 4-inch (100-mm) minimum width flange, and 26-inch- (660-mm-) diameter flat grate having small square or short-slotted drainage openings.

2.4 PUMP STATION

A. The manufacturer shall furnish and deliver fully assembled grinder pump stations to the contractor.

1. One unit containing two pumps and all necessary parts and equipment shall be installed in fiberglass reinforced polyester tanks for outside installation.
2. All equipment shall be factory installed except for externally mounted control panel, pumping units, and gravity sewer inlet hubs which are to be installed in the field.

B. Each pre-assembled duplex station shall include the basin, basin cover, grinder pump and motor, quick disconnect rail system, check valve, junction box, start-stop level controls, motor high temperature shut-off, motor seal leak alarm, high water alarm, all internal wiring terminating into junction box, shutoff valve and Schedule 80 PVC discharge piping and fittings.

1. In addition, an external alarm and pump control panel is to be provided for each unit.

SECTION 02700 – SEWERAGE AND DRAINAGE

- C. All units required for this project shall be of the same brand and be identical in all respects per horsepower ratings.

2.5 PUMPS

A. Operating Conditions

1. Each grinder pump shall be of the centrifugal design and be capable of delivering a minimum of 25 GPM at 30 feet head .

B. Pump

1. The pump shall have an integrally built-in grinder unit and submersible type motor. The pump shall be suspended in the basin by two (2) 1" stainless steel guide rails and quick disconnect lift-out mounting assembly. Solids shall be fed in an up-flow direction to the grinder mechanism with no obstructions below the grinder inlet.

C. Grinder Assembly & Construction

1. The grinder unit shall be capable of cutting solid material found in normal domestic sewage, including reasonable amounts of foreign objects, such as wood, plastic, glass, rubber, sanitary napkins, disposable diapers and pantyhose into a fine slurry that will pass freely through the pump, service line and force main.
 - a. The grinder assembly shall consist of a rotating radial cutter and a stationary shredding ring, and shall be mounted directly below the volute passage.
 - b. The rotating cutter shall be threaded onto the stainless steel shaft and shall be locked with a screw and washer.
 - c. The stationary shredding ring shall be pressed onto an iron holding flange for easy removal.
 - d. The flange shall be provided with tapped back-off holes so that screws can be used to push the shredding ring from the housing.
 - e. Both the radial cutter and shredding ring shall be removable from the outside without dismantling pump.
 - f. Grinder assembly shall be of such construction that no clearance adjustments are required when assembling.
 - g. All grinding of solids shall be from the action of the radial cutter against the shredding ring.
 - h. The radial cutter and shredding ring shall be of #440 stainless steel hardened to 58-60 Rockwell C.

D. Motor

1. The pump motor(s) shall be of the submersible type rated for 2 horsepower at 3450 RPM. Motor shall be 3 phase, 460 volt, 60 Hertz.
2. Single-phase motors shall be of the capacitor start-capacitor run type for high starting torque.
3. The stator winding shall be the open type with Class F insulation.
4. The winding housing will be filled with clean dielectric oil that will lubricate bearings, seals and transfer heat from the windings to the outer shell.
5. The motor stator is to be pressed into the motor housing for optimum concentricity and alignment, and maximum heat transfer. Pump motors without press fit housings will not

SECTION 02700 – SEWERAGE AND DRAINAGE

be considered for this project.

6. The motor shall be capable of operating over full range of performance curve without overloading motor and causing any objectionable noise or vibration.
7. The motor shall have three bearings to support the rotor; an upper ball bearing to accommodate thrust loads, an intermediate ball bearing to take radial loads, and a sleeve bearing in the seal chamber to prevent shaft deflection at the lower seal from radial shock loading of the grinder impeller.
8. Ball bearings shall be designed for a LB-10 life (50,000 hours).
9. A heat sensor thermostat shall be attached to the top end of the motor windings and shall be connected in series with a holding relay in the control box to stop the motor if the motor winding temperature reaches 200 degrees Fahrenheit.
10. The high temperature shutoff will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The thermostat shall reset automatically when the motor cools to a safe operating temperature.
11. The common motor, pump and grinder shaft shall be of #416 stainless steel. The pump impeller and the grinder impeller shall thread onto shaft.
12. All motors shall be of domestic manufacture and shall incorporate US made materials including castings, windings, etc. **Motors not manufactured in the Continental United States will not be considered. Verifications of US manufacture including foundry certification shall be supplied to the engineer at his or her request.**

E. Power Cords

1. Motor power cords shall be #14-4 type SOW/SOW-A, four conductors, while the motor control cord shall be #18-5 Type SO, five conductor.
2. Sufficient cord length shall be used so that the pump may be removed without disconnecting power and control wires from junction box.
3. Cord lengths shall be such that no splices will be required between the pump and junction box at top of basin.
4. In order to prevent possible wicking of moisture into the motor as a result of damaged cables, all leads from the power and control cords are to be potted into the motor end cap using a polyurethane type resin.
5. Power and control leads are to be non-wicking wire inside the motor end cap and connected to the pump cables by a compression type connector.
6. The pump lead and control wires shall also be held captive into the motor housing by a grommet and flange type compression fitting. The pump and control cords shall be able to withstand a minimum of 200-lb. pull without sacrificing the seal into the motor.
7. The end cap shall have female thread tapping for 1-1/2" conduit.

F. Seal Chamber

1. The motor shall be protected by two (2) rotary shaft seals mounted in tandem with an oil filled chamber separating the seals.
2. The seals shall have carbon and ceramic seal faces diamond lapped to a tolerance of one light band. Metal parts and springs for seals shall be stainless steel.
3. An electrical sensing probe shall be mounted in the seal chamber to detect any water leakage past the lower seal. All pumping units shall have this dual seal arrangement. Units incorporating single seals or utilizing a lip seal arrangement will not be acceptable on this project.

SECTION 02700 – SEWERAGE AND DRAINAGE

F. Pump Impeller

1. The pump impeller shall be of the recessed type to provide an open unobstructed passage through the volute for the ground solids.
2. Pumps may be required to operate at or near shut off head conditions. Recessed impellers are required to reduce the bearing loading and prolong pump life.
3. Pumps without recessed impellers will not be considered equal.
4. The impeller shall be constructed of stainless steel and shall have pump out vanes on the back side of the impeller to keep solids from lower seal and reduce pressure at the seal faces.
5. Impeller shall be threaded onto the stainless steel shaft.
6. Grinder pumps having thermoplastic or non-metal impellers or pump volutes are specifically prohibited.

H. Pump & Motor Castings

1. All iron casting shall be of high tensile cast iron and shall be properly cleaned, pre-treated with chromic rinse, and painted with high quality enamel paint.
2. All pump components that are not cast iron or stainless steel shall be galvanized or painted with baked on epoxy.
3. All fasteners shall be #302 stainless steel.
4. Grinder pumps utilizing air filled motors or foreign made steel will not be acceptable.

2.6 FIBERGLASS BASIN ASSEMBLY

A. Basin

1. The basin shall be 48" diameter and depth as shown on the plans. The basin shall be molded of fiberglass reinforced polyester resin manufactured by the lay-up and spray technique to assure that the interior surface is smooth and resin rich.
2. Twenty-five percent (25%) glass fibers shall be used and resin shall be POLYCOR 939-X-100 as manufactured by Cook Paint and Varnish Company or equal.
3. The basin wall shall be designed to withstand a wall collapse based on the assumption of hydrostatic type loading by back-fill with a minimum density of 120 pounds per cubic foot.
4. The basin wall laminate shall be constructed to withstand or exceed two times the assumed loading for any depth of basin.
5. The basin bottom shall be sufficient thickness to withstand applicable hydrostatic uplift pressure with a safety factor of two. In saturated conditions, the center deflection of the empty basin bottom shall be less than 3/8" (elastic deflection) and shall not interfere with bottom pump mounting requirements.
6. Anti-flotation means shall be provided with each basin. A fiberglass anti-flotation collar shall be provided as an integral part of all basins; the anti-flotation collar shall extend a minimum of 3" beyond the O.D. of the basin wall
7. Corrosion resistant nuts shall be embedded in the top flange of the basin for securing the basin cover. a quantity of six (6) shall be provided; the nuts shall be totally encapsulated in fiberglass to prevent turning and corrosion.

B. Basin Cover

1. The cover shall be diamond-plated aluminum.

SECTION 02700 – SEWERAGE AND DRAINAGE

2. The cover shall be bolted to the basin with stainless steel cap screws. Cadmium plated nuts for the screws shall be embedded in the fiberglass to prevent turning and for corrosion resistance.

C. Shutoff Valve

1. A PVC true union ball type shutoff valve with Teflon seats shall be furnished and installed in the discharge piping, as shown on the plans.
2. If the discharge depth is more than 2 feet from the surface, a handle extension shall be supplied.

D. Piping

1. Schedule 80 PVC discharge piping shall connect to the stationary discharge base lift assembly and terminate at a 1-1/2" NPT discharge flange mounted on the basin at the height shown on the drawing.

E. Rail Assembly

1. Each lift-out system shall consist of a ductile iron discharge base, stainless steel pump guide plate and cast iron elbow/check valve. All exposed nuts, bolts, and fasteners shall be 300 series stainless steel.
2. The elbow/check valve shall be bolted to the pump. As simple downward sliding motion of the pump and guide plate on the guide rails shall cause the unit to be automatically connected and sealed to the base. A nitrile discharge flange seal shall be bolted between the pump and elbow/check valve. The discharge flange seal shall provide a leak proof seal at all operating pressures.
3. Two guide rail pipes shall be used to guide the pump from the surface to the discharge base connection.
4. The guide rails shall be 1" stainless steel pipe. The weight of the pump shall bear solely on the discharge base and not on the guide rails.
5. Rail systems which require the pump to be supported by legs which might interfere with the flow of solids into the pump suction will not be considered equal. The guide rail shall be firmly attached to the access hatch frame. Systems deeper than 12 feet shall require an intermediate guide for each 12 feet of wet well depth.
6. An adequate length of stainless steel lifting chain shall be supplied for removing the pump. The chain shall be of sufficient length and strength for easy removal

F. Check Valve

1. The lift-out check valve shall be of the ball type with a corrosion resistant neoprene ball.
2. The ball shall be the only moving part and shall move automatically out of the path of flow, thus providing an unobstructed smooth flow through the valve body.
3. Upon pump shut-off the ball shall automatically roll to the closed position to provide a positive seal against back pressure or back flow. The check valve insert shall be stainless steel.
4. The discharge case shall be securely bolted to the basin floor and arranged in such a way that slight deflection caused by the discharge pipe will not cause the quick-connect pump flange to leak.
5. A lifting chain shall be securely fastened to the top of the pump and to the top of the basin to facilitate removal of the pump.

SECTION 02700 – SEWERAGE AND DRAINAGE

6. The chain shall be minimum of 1/4" stainless steel welded link type, or of adequate strength, required to effectively support the weight of the pump assembly while removing and installing.

G. Inlet Flange

1. A basin inlet flange for 8" SCH 40 plastic pipe shall be included, but not mounted on the basin.
2. The flange to be mounted in the field at inlet height required by the installation, or as shown on the drawing.
3. The flange shall be furnished with a gasket to seal between the basin and flange and also include mounting bolts. A rubber transition type gasket shall be supplied to seal 8" SCH 40 PVC pipe into the basin hub.

2.7 PUMP STATION CONTROLS

A. General

- 1 Each duplex grinder pump panel shall control two 2 HP, 460 volt, 3 Phase, 60 Hertz grinder pumps.
- 2 The enclosure shall be NEMA 3R ,outdoor, minimum 24" high, 24" wide, 6" deep, fabricated from hot dipped galvanized steel, painted gray with a stainless steel continuous hinge and provision for padlocking.
- 3 The back panel and hinged dead front shall be constructed of 5052-H32 corrosion resistant aluminum.
- 4 All mounting holes shall be drilled and tapped. Self-tapping metal screws shall not be used to mount any components. All bolts, nuts, washers, lockwashers, and machine screws shall be stainless steel.
- 5 The enclosure shall have external mounting feet to allow for wall mounting.

B. Component Description - The following components shall be mounted through the dead front:

- 2 - Pump run indicator lights
- 2 - Hand-Off-Auto selector switches
- 2 - Two pole pump circuit breakers

The following components shall be mounted to the back panel:

- 1 - Set main line lugs (for incoming supply) except where main circuit breaker is supplied
- 2 - pump contactors
- 2 - Ambient-compensating overload relays
- 8 - Terminals for float connections
- 14 - Terminals for motor connections

C. Options - The following options shall be included:

1. Alarm beacon, Red, mounted on top of the enclosure- The alarm beacon shall be NEMA 4X lexan. The bulb and socket shall be removable from the inside without the use of any tools.
2. Flasher-The flasher shall be solid state and totally encapsulated and shall flash the alarm beacon at a rate of approximately 60 flashes per minute.

SECTION 02700 – SEWERAGE AND DRAINAGE

3. Seal failure module with indicator light for each pump-Seal failure modules shall be installed on the back panel to detect motor seal failure. The modules shall energize the dead front mounted "Seal Failure" lights when the resistance across the probes drops to approximately 50,000 ohms or less.
4. Motor overtemperature indicator light for each pump on dead front-Motor over temperature indicator lights shall be installed on the dead front to indicate a motor overtemperature condition. Either pump shall stop on overtemperature and restart automatically when the overtemperature condition clears itself.

G. LEVEL CONTROLS, ALARMS SWITCHES, JUNCTION BOX

1. Level Controls

- a. Four mercury tube float type switches shall control pump on and off levels.
- b. The mercury switch shall be sealed in a solid polyurethane float ball. The support wire shall be 16-2 SJOW (neoprene jacket) and weight shall be attached to the cord above the float to hold the switch in place in the sump.
- c. The level control switches shall be red in color.
- d. The high water alarm switch shall be the same as the level control switch, except a built-in stabilization weight shall be supplied instead of an external weight and the switch shall be colored orange.
- e. The level controls shall be supported in the sump by a bracket and cord snubber, which will give positive support to the controls and allow flexibility in the set levels.

2. Junction Box

- a. The junction box shall be constructed of fiberglass for corrosion resistance, stability and mechanical strength.
- b. The enclosure shall be of adequate thickness and properly reinforced to provide good mechanical strength.
- c. The junction box shall have a fully gasketed cover that is held in place by four (4) captive stainless steel screws that cannot be removed from the cover, with heads totally encapsulated in PVC so that no metal parts are exposed.
- d. The screw heads shall be of adequate size so that they may easily be installed and removed without the use of special tools.
- e. The cover shall be fastened to the main body of the junction box by means of a totally corrosion resistant tether, to prevent dropping the cover into the basin during service
- f. An adequate number of sealing type cord grips shall be supplied for incoming pump and switch cords. The cord grips shall be made of non-corrosive material, such as PVC or nylon, and shall make an effective seal around the wire jacket. The cord grip shall also seal to the junction box wall with "O" ring, gasket, or other effective means.
- g. The junction box shall have a PVC solvent weld socket type conduit hub mounted in the bottom of the enclosure. The hub shall be of a corrosion resistant material and shall be of adequate size to accommodate the number of wires required to operate the pump.

SECTION 02700 – SEWERAGE AND DRAINAGE

- h. The interior of the enclosure shall be of adequate size to accommodate the wires and connections required to operate the pump.
- i. The junction box shall be designed to NEMA 6 standards for occasional submergence.

2.8 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, ACI 350R, 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. Structures: Portland-cement design mix, 4000 psi (27.6 MPa) minimum, with 0.45 maximum water-cement ratio.
 - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 - 2. Reinforcement Bars: ASTM A 615, Grade 60 (ASTM A 615M, Grade 400), deformed steel.
- C. Structure Channels and Benches: Factory or field formed from concrete. Portland-cement design mix, 4000 psi (27.6 MPa) minimum, with 0.45 maximum water-cement ratio.
 - 1. Include channels and benches in manholes.
 - 2. Include channels and benches in sanitary sewerage manholes.
 - a. Manhole Channels: Concrete invert, formed to same width as connected piping, with height of the vertical sides to 3/4 of the pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - 1) Invert Slope: 1.2 inches (30 mm) through manhole.
 - b. Manhole Benches: Concrete, sloped to drain into channel.
 - 1) Slope: 1 inch per foot (1:12).
- D. Ballast and Pipe Supports: Portland-cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water-cement ratio.
 - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 - 2. Reinforcement Bars: ASTM A 615, Grade 60 (ASTM A 615M, Grade 400), deformed steel.

2.9 PROTECTIVE COATINGS

- A. General: Include factory- or field-applied protective coatings to structures and appurtenances according to the following:

SECTION 02700 – SEWERAGE AND DRAINAGE

- B. Coating: 1- or 2-coat, coal-tar epoxy, 15-mil (0.381-mm) minimum thickness, except where otherwise indicated.

1. Manholes: On exterior surface.
2. Manhole Frames and Covers: On entire surfaces.
3. Catch Basins: On exterior surface.
4. Catch Basin Frames and Grates: On entire surfaces.

2.10 OUTFALLS

- A. Install precast concrete flared end sections.
- B. Riprap: See plan for sizes.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.2 IDENTIFICATION

- A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installation of green warning tapes directly over piping and at outside edges of underground structures.
 1. Use warning tapes or detectable warning tape over ferrous piping.
 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.3 SEWERAGE PIPING APPLICATIONS

- A. General: Include watertight joints.
- B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to the following applications.
- C. Pipe Sizes 4 and 6 (100 and 150 mm): ASTM D 3034, polyvinyl chloride (PVC) sewer pipes and fittings; solvent – cemented joints; or with gaskets and gasketed joints.
- D. Pipe Sizes 8 and 10 Inches (200 and 250 mm): ASTM D 3034, polyvinyl chloride (PVC) sewer pipe and fittings; solvent-cemented joints; or with gaskets and gasketed joints.

3.4 DRAINAGE PIPING APPLICATIONS

- A. General: Include watertight, silttight, or soiltight joints, except where watertight or silttight joints are indicated.
- B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to the following applications.

SECTION 02700 – SEWERAGE AND DRAINAGE

- C. Pipe Sizes 18 to 36 Inches (450 to 900 mm): Reinforced-concrete sewer pipe and fittings; rubber gaskets; and gasketed joints.
- D. Pipe Sizes 42 to 144 Inches (1050 to 3600 mm): Reinforced-concrete sewer pipe and fittings; rubber gaskets; and gasketed joints.

3.5 FORCE MAIN PIPING APPLICATION

- A. General: Include water tight joints.
- B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to the following applications.
- C. Pipe Sizes less than 4 inches (100 mm): ASTM D-3034 Schedule 80 polyvinyl chloride (PVC) sewer pipe and fittings; solvent – cemented joints.

3.6 INSTALLATION, GENERAL

- A. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of underground sewerage and drainage systems piping. Location and arrangement of piping layout take into account many design considerations. Install piping as indicated, to extent practical.
- B. Install piping beginning at low point of systems, 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 recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.
- C. Use manholes for changes in direction, except where fittings are indicated. Use fittings for branch connections, except where direct tap into existing sewer is indicated.
- D. Use proper size increasers, reducers, and couplings, where different sizes or materials of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.
- E. Install gravity-flow-systems piping at constant slope between points and elevations indicated. Install straight piping runs at constant slope, not less than that specified, where slope is not indicated.
- D. Extend sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
- E. Extend drainage piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.
- F. Installation shall be in accordance with manufacturer's recommendations.
- G. All work shall be done by an organization with prior experience in the installation and commissioning of similar type pump stations.

SECTION 02700 – SEWERAGE AND DRAINAGE

3.7 PIPE JOINT CONSTRUCTION AND INSTALLATION

- A. General: Join and install pipe and fittings according to the following.
- B. Polyvinyl Chloride (PVC) Plastic Pipe and Fittings: As follows:
 - 1. Join solvent-cement-joint pipe and fittings with solvent cement according to ASTM D 2855 and ASTM F 402.
 - 2. Join pipe and gasketed fittings with elastomeric seals according to ASTM D 2321.
 - 3. Join profile sewer pipe and ribbed drain pipe and gasketed fittings with elastomeric seals according to ASTM D 2321 and manufacturer's written instruction.
 - 4. Install according to ASTM D 2321.
- C. Concrete Pipe and Fittings: Install according to ACPA "Concrete Pipe Handbook." Use the following seals:
 - 1. Round Pipe and Fittings: ASTM C 443 (ASTM C 443M), rubber gaskets.
 - 2. Elliptical Pipe: ASTM C 877 (ASTM C 877M), Type I, sealing bands.
 - 3. Arch Pipe: ASTM C 877 (ASTM C 877M), Type I, sealing bands.

3.8 MANHOLE INSTALLATION

- A. General: Install manholes, complete with accessories, as indicated.
- B. Form continuous concrete channels and benches between inlets and outlet, where indicated.
- C. Set tops of frames and covers flush with finished surface where manholes occur in pavements. Set tops flush with finished surface elsewhere, except where otherwise indicated.
- D. Place precast concrete manhole sections as indicated, and install according to ASTM C 891.
 - 1. Provide rubber joint gasket complying with ASTM C 443 (ASTM C 443M), at joints of sections.
 - 2. Apply bituminous mastic coating at joints of sections.

3.9 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

3.10 STORM DRAINAGE INLET AND OUTFALL INSTALLATION

- A. Construct riprap of broken stone, as indicated.
- B. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

3.11 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318, ACI 350R, and as indicated.

SECTION 02700 – SEWERAGE AND DRAINAGE

3.12 FIELD QUALITY CONTROL

- A. Clear interior of piping and structures of dirt and superfluous material as the work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.
 - 1. In large, accessible piping, brushes and brooms may be used for cleaning.
 - 2. Place plug in end of incomplete piping at end of day and whenever work stops.
 - 3. Flush piping between manholes and other structures, if required by authorities having jurisdiction, to remove collected debris.
- B. 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 the Project.
 - 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 visual between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of a ball or cylinder of a size not less than 92.5 percent of piping diameter.
 - c. 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.
- C. 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 authorities having jurisdiction.
 - 3. Schedule tests, and their inspections by authorities having jurisdiction, with at least 24 hours' advance notice.
 - 4. Submit separate reports for each test.
 - 5. Where authorities having jurisdiction do not have published procedures, perform tests as follows:
 - a. Sanitary Sewerage: Perform air test according to UNI-B-6.
 - 1) Option: Test concrete piping according to ASTM C 924 (ASTM C 924M).
 - 6. Manholes: Perform hydraulic test according to ASTM C 969 (ASTM C 969M).
 - 7. Leaks and loss in test pressure constitute defects that must be repaired.
 - 8. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.

SECTION 02700 – SEWERAGE AND DRAINAGE

PART 4 - MISCELLANEOUS

4.1.1 MANUFACTURER'S WARRANTY

- A. The manufacturer of the pump station shall warrant it to be free from defects in materials and workmanship for two years after start up of the station.

END OF SECTION

SECTION 02741 – SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes water-distribution piping and related components beyond five (5) feet from the building for water service and fire-service mains.

1.2 DEFINITIONS

- A. CLDIP: Cement lined ductile iron pipe.
- B. PVC: Polyvinyl chloride plastic
- C. HDPE: High Density Polyethylene

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

1.4 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.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
 - 1. Ensure that valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends and flange faces.
 - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:

SECTION 02741 – SITE WATER UTILITY DISTRIBUTION PIPING

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

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. Notify Owner no fewer than two days in advance of proposed interruption of service.
 2. 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 MANUFACTURERS

- A. Piping, Fittings, Gate Valves, Accessories, Specialties and Fire Hydrants
1. Manufacturers: Subject to compliance with requirements, provide products specified on drawings, or equal.
 2. All Products: Manufactured or extracted within 500 miles of the project site.

SECTION 02741 – SITE WATER UTILITY DISTRIBUTION PIPING

2.2 DUCTILE-IRON 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. Flanges: ASME 16.1, Class 125, cast iron.

2.3 DUCTILE-IRON 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. Flanges: ASME 16.1, Class 125, cast iron.

2.4 PVC PIPE AND FITTINGS

- A. PVC, AWWA Pipe: AWWA C900, pressure Class 150, 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, pressure Class 150, 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 Site Water Utility
 - 4. each bell.

SECTION 02741 – SITE WATER UTILITY DISTRIBUTION PIPING

5. Gasketed joint shall meet the requirements of ASTM D-3139, and the joint gasket shall conform to ASTM F-477.
6. 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.
7. 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.

2.5 HDPE PIPE AND FITTINGS

- A. HDPE Pipe, AASHTO/ASTM M294/F892, AWWA C906 meeting ANSI/NSF Standard 14, SDR 7.0 corrugated with integrally formed smooth interior.
 1. N-12 pipe by Advanced Drainage Systems, Inc. (ADS).
 2. Titeline by Hancor.
 3. Or Engineer approved equal.
 4. AWWA C906 and NSF 14 identifications shall appear on exterior wall print line.
- B. HDPE Joints, ASTM D3212, ANSI/NSF Standard 14, watertight joints using watertight sleeves.
 1. Sleeves shall have an indentation in the center to ensure proper positioning of the pipe.
 2. Sleeves shall be factory installed on one end of the pipe with a factory installed gasket on the other end.
- C. Gaskets, ASTM F477, solid cross section rubber manufacturer to fit the pipe and fittings.
- D. Lubricant used in making up joints shall be supplied, or recommended, by the pipe manufacturer and the joints shall be coupled in accordance with manufacturer's requirements.

2.6 GATE VALVES

- A. AWWA, Cast-Iron Gate Valves:
 1. 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 AVK Co.; Valves & Fittings Div.
 - b. American Cast Iron Pipe Co.; American Flow Control Div.
 - c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
 - d. Crane Co.; Crane Valve Group; Stockham Div.
 - e. East Jordan Iron Works, Inc.
 - f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
 - g. McWane, Inc.; Kennedy Valve Div.
 - h. McWane, Inc.; M & H Valve Company Div.

SECTION 02741 – SITE WATER UTILITY DISTRIBUTION PIPING

- i. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
- j. NIBCO INC.
- k. U.S. Pipe and Foundry Company.
- l. Or approved equal.

2. 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.

2.7 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or approved equal per the Township of Pittsgrove Sewer and Water Department.
- 2. 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.

2.8 FIRE HYDRANTS

A. Wet-Barrel Fire Hydrants:

- 1. 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 AVK Co.; Valves & Fittings Div.
 - b. Jones, James Company.
 - c. McWane, Inc.; Clow Valve Co. Div. (Corona).

SECTION 02741 – SITE WATER UTILITY DISTRIBUTION PIPING

- d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
 - e. Approved equal.
- 2. Description: Freestanding, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, NPS 6 (DN 150) threaded or flanged inlet, and base section with NPS 6 (DN 150) mechanical-joint inlet.
 - a. Standards: AWWA C503.
 - b. Pressure Rating: 150 psig (1035 kPa) minimum.
 - c. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
 - d. Operating and Cap Nuts: Pentagon, 1-1/2 inches (38 mm) point to flat.
 - e. Direction of Opening: Open hydrant valves by turning operating nut to left or counterclockwise.
 - f. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Section "Earthwork" 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, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground water-service and fire-service piping NPS 4 to NPS 8 (DN 100 to DN 200) shall be the following:
 - 1. Pipe shall conform to AWWA-C900 and shall be UL and FM approved.

3.3 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 (DN 50) and smaller installation.

SECTION 02741 – SITE WATER UTILITY DISTRIBUTION PIPING

- B. Drawings indicate valve types to be used.

3.4 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. Bury piping with depth of cover over top at least 42 inches (1070 mm), with top at least 12 inches (300 mm) below level of maximum frost penetration, and according to the following:
 - 1. Under Driveways: With at least 42 inches (1070 mm) cover over top.
- G. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- H. 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.
- I. Sleeves are specified in Division 15 Plumbing.
- J. Mechanical sleeve seals are specified in Division 15 Plumbing.
- K. 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.
- L. See Division 15 Plumbing sections for potable-water piping inside the building.

SECTION 02741 – SITE WATER UTILITY DISTRIBUTION PIPING

3.5 JOINT CONSTRUCTION

- A. See Division 15 Plumbing Sections 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.

3.6 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.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.7 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.

3.8 FIRE HYDRANT INSTALLATION

- A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
- B. Wet-Barrel Fire Hydrants: Install with valve below frost line. Provide for drainage.
- C. AWWA Fire Hydrants: Comply with AWWA M17.
- D. UL/FMG Fire Hydrants: Comply with NFPA 24.

SECTION 02741 – SITE WATER UTILITY DISTRIBUTION PIPING

3.9 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Plumbing Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. See Division 15 Plumbing Sections for piping connections to valves and equipment.
- C. Connect water-distribution piping to existing water main. Use tapping sleeve and tapping valve.
- D. Connect water-distribution piping to interior domestic water and fire-suppression piping.
- E. Ground equipment according to Division 16 Electrical Sections.

3.10 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.

3.11 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 "Earthwork."
- B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Division 15 Plumbing Sections for identifying devices.

3.12 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 AWWA C651 or do as follows:

SECTION 02741 – SITE WATER UTILITY DISTRIBUTION PIPING

- 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

SECTION 02821 – CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vinyl coated fence framework, fabric, and accessories.
2. Excavation for post bases.
3. Concrete foundation for posts
4. Manual gates and related hardware.
5. Temporary fencing

1.2 REFERENCES

A. American Society for Testing and Materials:

1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
4. ASTM A491 - Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric.
5. ASTM A569/A569M - Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality.
6. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
7. ASTM B429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
8. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
9. ASTM F567 - Standard Practice for Installation of Chain-Link Fence.
10. ASTM F668 - Standard Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Chain Link Fence Fabric.
11. ASTM F900 - Standard Specification for Industrial and Commercial Swing Gates.
12. ASTM F934 - Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.
13. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.
14. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

B. Chain Link Fence Manufacturers Institute:

1. CLFMI - Product Manual.

1.3 SYSTEM DESCRIPTION

- A. Permanent Fence Height: 6 & 8 feet nominal, vinyl coated wire.
- B. Temporary Fence Height: 8 feet nominal, no coating of wire required.

SECTION 02821 – CHAIN LINK FENCES AND GATES

- C. Line Post Spacing: At intervals not exceeding 10 feet.
- D. Fence Post and Rail Strength: Conform to ASTM F1043 Light Industrial Fence quality.

1.4 SUBMITTALS

- A. Under provisions of Division 1 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
- C. Product Data: Submit data on fabric, posts, accessories, fittings and hardware.

1.5 CLOSEOUT SUBMITTALS

- A. Under provisions of Division 1 - Execution Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Procedures for submittals.

1.6 QUALITY ASSURANCE

- A. Supply material in accordance with CLFMI - Product Manual.
- B. Perform installation in accordance with ASTM F567.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum two years documented experience.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Under provisions of Division 1 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.
- C. Identify each package with manufacturer's name.
- D. Store fence fabric and accessories in secure and dry place.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers
 - 1. Anchor Fence Inc.

SECTION 02821 – CHAIN LINK FENCES AND GATES

2. Merchants Metals.
3. Page - Wilson Corporation.
4. or approved equal

2.2 MATERIALS AND COMPONENTS

- A. Materials and Components: Conform to CLFMI Product Manual
- B. Fabric Size: CLFMI Light Industrial.
- C. Intermediate Posts: Type I round or square.
- D. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round or square.

2.3 MATERIALS – Not used

2.4 COMPONENTS

- A. Line Posts: 2-inch diameter.
- B. Corner and Terminal Posts: 2.38 inch.
- C. Gate Posts: 2.875 inch diameter.
- D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.
- E. Gate Frame: 1.66 inch diameter for fittings and truss rod fabrication.
- F. Fabric: 2 inch diamond mesh interwoven wire, 9 gage thick (wire gauge), top salvage knuckle end closed, bottom salvage knuckle end closed, vinyl coated, black finish.
- G. Tension Wire: 6 gage thick steel, single strand.
- H. Tie Wire: Aluminum alloy steel wire.
- I. Temporary Fence Fabric: 11 gauge thick, standard finish.

2.5 ACCESSORIES

- A. Caps: Cast steel galvanized or Galvanized pressed steel; sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; galvanized steel.
- C. Gate Hardware: Fork latch with gravity drop; two 180 degree gate hinges for each leaf.
- D. Privacy Slats: Vinyl strips, flat configuration, sized to fit fabric weave, color black.

SECTION 02821 – CHAIN LINK FENCES AND GATES

2.6 GATES

A. General

1. Gate Types, Opening Widths and Directions of Operation: As indicated on Drawings
2. Factory assemble gates
3. Conform to requirements specified for PVC coated steel chain link fence except that PVC coated aluminum alloy framing conforming to ASTM B429 may be used
4. Design gates for operation by one person

B. Swing Gates

1. Fabricate gates to permit 180 degree swing.
2. Gates Construction: ASTM F900 with welded corners. Use of corner fittings is not permitted.

2.7 FINISHES

- A. Components and Fabric: Vinyl coating, black color in accordance with ASTM F934 over coating of 1.8 oz/sq ft galvanizing.
- B. Vinyl Components: color to match fabric.
- C. Hardware: Galvanized to ASTM A153/A153M, 1.8 oz/sq ft coating.
- D. Accessories: Same finish as framing.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567.
- B. Set all posts plumb, in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff
- C. Line Post Footing Depth Below Finish Grade: ASTM F567.
- D. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567.
- E. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
- F. Install top rail through line post tops and splice with 6 inch long rail sleeves.
- G. Install center and bottom brace rail on corner gate leaves.

SECTION 02821 – CHAIN LINK FENCES AND GATES

- H. Place fabric on outside of posts and rails.
- I. Do not stretch fabric until concrete foundation has cured 28 days.
- J. Stretch fabric between terminal posts or at intervals of 100 feet (30 m) maximum, whichever is less.
- K. Position bottom of fabric 2 inches above finished grade.
- L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches (380 mm) on centers.
- M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- N. Install bottom tension wire stretched taut between terminal posts.
- O. Install gate with fabric to match fence. Install three hinges on each gate leaf, latch, catches, retainer and locking clamp.
- P. Excavate holes for posts to diameter and spacing indicated on Drawings without disturbing underlying materials.
- Q. Center and align posts. Place concrete around posts, and vibrate or tamp for consolidation. Verify vertical and top alignment of posts and make necessary corrections.
- R. Extend concrete footings 1 in (25 mm) above grade, and trowel, forming crown to shed water.
- S. Allow footings to cure minimum 7 days before installing fabric and other materials attached to posts.

3.3 ERECTION TOLERANCES

- A. Under provisions of Division 1 - Quality Requirements: Tolerances.
- B. Maximum Variation From Plumb: 1/4 inch.
- C. Maximum Offset From Indicated Position: 3 inch.

END OF SECTION

SECTION 02920 – TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Fine grading and preparing lawn areas.
2. Furnishing and applying new topsoil.
3. Furnishing and applying soil amendments.
4. Furnishing and applying fertilizers.
5. Seeding new lawns.
6. Reconditioning existing lawn areas.
7. Replanting unsatisfactory or damaged lawns.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section "Site Clearing" for protection of existing trees and planting, topsoil stripping and stockpiling, and site clearing.
2. Section "Earthwork" for excavation, filling, rough grading, and subsurface aggregate drainage and drainage backfill.

1.2 SUBMITTALS

A. Product data for the following:

1. Aluminum sulfate.
2. Fertilizers.

B. Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for sod, identifying sod source, including name and telephone number of supplier.

C. Certification by product manufacturer that the following products supplied comply with requirements:

1. Limestone.
2. Fertilizers.

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 address of architects and owners, and other information specified.

E. Material test reports from qualified independent testing agency indicating and interpreting test results relative to compliance of the following materials with requirements indicated.

1. Analysis of existing surface soil.
2. Analysis of imported topsoil.

SECTION 02920 – TURF AND GRASSES

- F. Planting schedule indicating anticipated dates and locations for each type of planting.
- G. Maintenance instructions recommending procedures to be established by Owner for maintenance of landscaping during an entire year. Submit before expiration of required maintenance periods.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful grass establishment.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on the Project site during times that grass planting is in progress.
- B. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- C. Topsoil Analysis: Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.
 - 1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce a satisfactory topsoil.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.5 COORDINATION AND SCHEDULING

- A. Planting Season: Sow lawn seed and install sod during normal planting seasons for type of lawn work required. Correlate planting with specified maintenance periods to provide required maintenance from date of Substantial Completion.
- B. Weather Limitations: Proceed with planting only when existing and forecast weather conditions are suitable for work.

1.6 MAINTENANCE

- A. Begin maintenance of lawns immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:
 - 1. Seeded Lawns: 60 days after date of Substantial Completion.

SECTION 02920 – TURF AND GRASSES

- a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established at that time, continue maintenance during next planting season.
- B. Maintain and establish lawns by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.
 - 1. Replant bare areas with same materials specified for lawns.
 - 2. Add new mulch in areas where mulch has been disturbed by wind or maintenance operations sufficiently to nullify its purpose. Anchor as required to prevent displacement.
- C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawns uniformly moist to a depth of 4 inches (100 mm).
 - 1. Lay out temporary lawn-watering system and arrange watering schedule to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly seeded, plugged, or sprigged areas.
- D. Mow seeded lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain following grass height:
 - 1. Mow grass from 2 to 3 inches (50 to 75 mm) high
- E. Postfertilization: Apply fertilizer to lawn after first mowing and when grass is dry.
 - 1. Use fertilizer that will provide actual nitrogen of at least 1 lb per 1000 sq. ft. (0.5 kg per 100 sq. m) of lawn area.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. All Products: Manufactured or extracted within 500 miles of the project site.

2.2 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances.
 - 1. Seed Mixture: Provide seed of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated on Schedules at the end of this Section.

SECTION 02920 – TURF AND GRASSES

2.3 TURFGRASS SOD

- A. Turfgrass Sod: complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances
 - 1. Turfgrass Species: Provide sod of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated on Schedules at the end of this Section.

2.4 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1 inch (25 mm) or larger in any dimension, and other extraneous materials harmful to plant growth.
 - 1. Topsoil Source: Reuse surface soil stockpiled on the site. Verify suitability of surface soil to produce topsoil meeting requirements and amend when necessary. Contractor is to provide testing of topsoil and provide results to owner. Supplement with imported topsoil when quantities are insufficient at no additional cost to the owner. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - 2. Topsoil Source: Import topsoil from off-site sources at no additional cost to the owner. Obtain topsoil from naturally well-drained sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from bogs or marshes.
 - 3. Topsoil Source: Amend existing surface soil to produce topsoil. Supplement with imported topsoil when required. If imported topsoil is used, it must be tested first and results provided to owner for approval. Owner reserves the right to reject any source of topsoil not meeting specifications.

2.5 SOIL AMENDMENTS

- A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 (2.36 mm) sieve and a minimum 75 percent passing a No. 60 (250 micrometer) sieve.
 - 1. Provide lime in the form of dolomitic limestone.
- B. Aluminum Sulfate: Commercial grade, unadulterated.
- C. Sand: Clean, washed, natural or manufactured sand, free of toxic materials.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Peat Humus: Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.
- F. Sawdust or Ground-Bark Humus: Decomposed, nitrogen-treated, of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
 - 1. When site treated, mix with at least 0.15 lb (2.4 kg) of ammonium nitrate or 0.25 lb (4 kg) of ammonium sulfate per cu. ft. (cu. m) of loose sawdust or ground bark.

SECTION 02920 – TURF AND GRASSES

- G. Manure: Well-rotted, unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.
- H. Herbicides: EPA registered and approved, of type recommended by manufacturer.
- I. Water: Potable.

2.6 FERTILIZER

- A. Bonemeal: Commercial, raw, finely ground; minimum of 4 percent nitrogen and 20 percent phosphoric acid.
- B. Superphosphate: Commercial, phosphate mixture, soluble; minimum of 20 percent available phosphoric acid.
- C. 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-form, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb per 1000 sq. ft. (0.5 kg per 100 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.
- D. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.7 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Peat Mulch: Provide peat moss in natural, shredded, or granulated form, of fine texture, with a pH range of 4 to 6 and a water-absorbing capacity of 1100 to 2000 percent.
- C. Fiber Mulch: Biodegradable dyed-wood cellulose-fiber mulch, nontoxic, free of plant growth- or germination-inhibitors, with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- D. Asphalt Emulsion Tackifier: Asphalt emulsion, ASTM D 977, Grade SS-1, nontoxic and free of plant growth- or germination-inhibitors.
- E. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application, nontoxic and free of plant growth- or germination-inhibitors.

SECTION 02920 – TURF AND GRASSES

2.8 EROSION-CONTROL MATERIALS

- A. Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.
- B. Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, 0.92 lb per sq. yd. (0.5 kg per sq. m) minimum, with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive lawns and grass for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect adjacent and adjoining areas from hydroseed overspraying.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 PLANTING SOIL PREPARATION

- A. Limit subgrade preparation to areas that will be planted in the immediate future.
- B. Loosen subgrade to a minimum depth of 6 inches (150 mm). Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter.
- C. Mix soil amendments and fertilizers with topsoil at rates indicated. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days. Either mix soil before spreading or apply soil amendments on surface of spread topsoil and mix thoroughly into top 4 inches (100 mm) of topsoil before planting.
 - 1. A "Planting Soil Amendments Schedule" is included at the end of this Section.
 - 2. Mix lime with dry soil prior to mixing fertilizer.
 - 3. Apply superphosphate fertilizer directly to subgrade before tilling, at the rate indicated.
 - 4. Incorporate fertilizer, applied at a rate that yields 50 pounds of nitrogen per acre.
 - 5. Incorporate pulverized limestone, if necessary, to adjust the pH of the topsoil to 6.5.
- D. Spread planting soil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen.

SECTION 02920 – TURF AND GRASSES

1. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.
 2. Allow for sod thickness in areas to be sodded.
- E. Preparation of Unchanged Grades: Where lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare soil as follows:
1. Remove and dispose of existing grass, vegetation, and turf. Do not turn over into soil being prepared for lawns.
 2. Till surface soil to a depth of at least 6 inches (150 mm). Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches (100 mm) of soil. Trim high areas and fill in depressions. Till soil to a homogenous mixture of fine texture.
 3. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
 4. Remove waste material, including grass, vegetation, and turf, and legally dispose of it off the Owner's property.
- F. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches (38 mm) in any dimension, and other objects that may interfere with planting or maintenance operations.
- G. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- H. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

3.4 SEEDING NEW LAWNS AND GRASSES

- A. Sow seed with a spreader or a seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in 2 directions at right angles to each other.
1. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.
- B. Sow seed at the following rates:
1. Seeding Rate: 350 lb. per acre. (159 kg per 100 sq. m).
- C. Apply seed by cyclone type spreader in areas not accessible by large spreading equipment. Rake seed lightly into top 1/8 inch (3 mm) of topsoil, roll lightly, and water with fine spray.
- D. Protect seeded slopes exceeding 1:4 against erosion with erosion-control blankets installed and stapled according to manufacturer's recommendations.
- E. Protect seeded slopes exceeding 1:6 against erosion with jute or coir-fiber erosion-control mesh installed and stapled according to manufacturer's recommendations.

SECTION 02920 – TURF AND GRASSES

- F. Protect seeded areas with slopes less than 1:4 against erosion by spreading straw mulch after completion of seeding operations. Spread uniformly at a minimum rate of 2 tons per acre (45 kg per 100 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.
 - 1. Anchor straw mulch by crimping into topsoil by suitable mechanical equipment.
 - 2. Anchor straw mulch by spraying with asphalt-emulsion tackifier at the rate of 10 to 13 gal. per 1000 sq. ft. (41 to 53 L per 100 sq. m). Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.
- G. Protect seeded areas against hot, dry weather or drying winds by applying peat mulch within 24 hours after completion of seeding operations. Soak and scatter uniformly to a depth of 3/16 inch (4.8 mm) thick and roll to a smooth surface.

3.5 HYDROSEEDING NEW LAWNS

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.
 - 1. Mix slurry with nonasphaltic tackifier.
 - 2. Apply slurry uniformly to all areas to be seeded in a 1-step process. Apply mulch at the minimum rate of 1500 lb per acre (16.5 kg per 100 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate.
 - 3. Apply slurry uniformly to all areas to be seeded in a 2-step process. Apply first slurry application at the minimum rate of 500 lb per acre (5.5 kg per 100 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate. Apply slurry cover coat of fiber mulch at a rate of 1000 lb per acre (11 kg per 100 sq. m).

3.6 SATISFACTORY LAWN

- A. Seeded lawns will be satisfactory provided requirements, including maintenance, have been met and a healthy, uniform, close stand of grass is established, free of weeds, bare spots exceeding 5 by 5 inches (125 by 125 mm), and surface irregularities.
- B. Replant lawns that do not meet requirements and continue maintenance until lawns are satisfactory.

3.8 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.
- B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period until lawn is established.

3.9 PLANTING SOIL AMENDMENTS SCHEDULE

- A. Lawns: Provide soil amendments in not less than the following quantities:

SECTION 02920 – TURF AND GRASSES

1. Weight of lime per 1000 sq. ft. (100 sq. m): 90lbs
2. Weight of commercial fertilizer per 1000 sq. ft. (100 sq. m): 11lbs

3.10 MIXTURES SCHEDULE

- A. Provide certified grass-seed blends or mixes, proportioned by weight, as follows, or approved equal:

Proportion	Name	Min. Pct. Germ.	Min. Pct. Pure Sd.	Max. Pct. Weed Sd.
45 pct.	Rebel Eveda Turf Type Tall Fescue	90	98	0.50
45 pct.	Justice Turf Type Tall Fescue	90	98	0.50
10 pct.	Tuckahoe Turf 3-D Bluegrass Blend	90	98	0.50

- B. Turfgrass Sod: Provide certified grass-seed blends or mixes, proportioned by weight, as follows, or approved equal:

Proportion	Name	Min. Pct. Germ.	Min. Pct. Pure Sd.	Max. Pct. Weed Sd.
45 pct.	Rebel Eveda Turf Type Tall Fescue	90	98	0.50
45 pct.	Justice Turf Type Tall Fescue	90	98	0.50
10 pct.	Tuckahoe Turf 3-D Bluegrass Blend	90	98	0.50

END OF SECTION

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.

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:
 - 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

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:
 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."

SECTION 03300 - CAST-IN-PLACE CONCRETE

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.
 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

- 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.
- 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

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.
 - 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

- 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.

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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

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:
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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

- 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.
 - 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

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 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

- 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.
- 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

- 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.
- 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

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.
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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

- 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.
 - 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

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.
- 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, restraightening, 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

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 restraightening 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.
- 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

- 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 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

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 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

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.
- 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.

SECTION 03300 - CAST-IN-PLACE CONCRETE

- 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.
- 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

SECTION 03300 - CAST-IN-PLACE CONCRETE

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).

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.
- C. 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.
- C. Catalog Cuts: Submit manufacturer's catalog cuts showing page and product numbers of units proposed for use in project.
- D. 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.
- E. 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.

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.

SECTION 04720 – CAST STONE MASONRY

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

- A. Manufacturer:
1. Continental Cast Stone, Website 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.

SECTION 04720 – CAST STONE MASONRY

- 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:
 - 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:

SECTION 04720 – CAST STONE MASONRY

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.

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.

SECTION 04720 – CAST STONE MASONRY

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.

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.

SECTION 04720 – CAST STONE MASONRY

- 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 repellant for weatherproofing cast stone masonry in accordance with manufacturer's instructions. See Specification 07200 for requirements.
- B. Apply water repellant 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:

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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 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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

- 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:
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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

- 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 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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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.

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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

2.4 BRICK

- A. General: Provide utility brick.
 - 1. Provide Face Brick Manufactured by: Bowerston Shale, or Glen-Gery, or Palmetto 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.
- 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: Per Owner selection from Manufacturer's standard color options.

2.5 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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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.

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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

- 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.
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

2.6 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: 0.187-inch diameter.
 - 4. Wire Size for Cross Rods: 0.187-inch diameter.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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 #270-2X S.I.S. ladder seismiclip interlock system joint reinforcement, standard weight, with hook spacing of 16 inches on center. Provide pre-fabricated 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.

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.

2.7 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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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:
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 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. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals..
 - 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.
 - b) Or approved equal
 - b. Attached to steel studs

SECTION 04810 - UNIT MASONRY ASSEMBLIES

- 1) Basis of Design: Hohmann & Barnard H&B-213 adjustable stainless steel veneer anchor, 2X-Hook and insulation retaining washer. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals. or approved equal
- 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 or approved equal).
- 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. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.
- 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.
 - b) Or approved equal.

2.8 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

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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.

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

SECTION 04810 - UNIT MASONRY ASSEMBLIES

- 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. Mastick/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.
- 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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

- 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 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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

2.9 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.
- 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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

- 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

2.10 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.

2.11 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 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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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.

2.12 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 ,veneer brick use Type N.

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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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.
- 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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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.
 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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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.
 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."

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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.
- 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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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.
 - 2. Embed tie sections in masonry joints.
 - 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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.

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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

- 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:
 - 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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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.
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.

SECTION 04810 - UNIT MASONRY ASSEMBLIES

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".

SECTION 04810 - UNIT MASONRY ASSEMBLIES

3.17 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess 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 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Framing with dimension lumber.
 - 2. Framing with engineered wood products.
 - 3. Wood furring, grounds, nailers, and blocking.
 - 4. Sheathing.

1.3 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise specified.
- B. Exposed Framing: Dimension lumber not concealed by other construction and indicated to receive a stained or natural finish.

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 the following products:
 - 1. Engineered wood products.
 - 2. Underlayment.
 - 3. Insulating sheathing.
 - 4. Air-infiltration barriers.
- C. 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's (ALSC) Board of Review.
- D. Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials:
 - 1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

SECTION 06100 - ROUGH CARPENTRY

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- B. Single-Source Responsibility for Engineered Wood Products: Obtain each type of engineered wood product from one source and by a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.
 - 1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

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:
 - 1. Wood-Preservative-Treated Materials:
 - a. Baxter: J. H. Baxter Co.
 - b. Chemical Specialties, Inc.
 - c. Continental Wood Preservers, Inc.
 - d. Osmose Wood Preserving, Inc.
 - e. or approved equal
 - 2. Laminated-Veneer Lumber:
 - a. Alpine Structures.
 - b. Georgia-Pacific Corp.
 - c. Trus Joist MacMillan.
 - d. or approved equal
 - 3. Prefabricated Wood I-Joists:
 - a. Trus Joist MacMillan.
 - b. Alpine Structures.
 - c. Georgia-Pacific Corp.
 - d. or approved equal
 - 4. Gypsum Sheathing Board:
 - a. Georgia-Pacific Corp.
 - b. National Gypsum Co.; Gold Bond Building Products Division.

SECTION 06100 - ROUGH CARPENTRY

- c. United States Gypsum Co.
 - d. or approved equal
- 5. Air-Infiltration Barriers:
 - a. Celotex Corporation (The); Building Products Division.
 - b. DuPont Company; Fibers Department.
 - c. or approved equal

2.2 LUMBER, GENERAL

- A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.
- B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NLGA - National Lumber Grades Authority (Canadian).
 - 3. RIS - Redwood Inspection Service.
 - 4. SPIB - Southern Pine Inspection Bureau.
 - 5. WCLIB - West Coast Lumber Inspection Bureau.
 - 6. WWPA - Western Wood Products Association.
- C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- D. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 1. Provide dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPAC2 (lumber) and AWPAC9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.
- B. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft. (6.4 kg/cu. m).
- C. All preservative treated materials should all be secured by stainless steel screws or fasteners with isolated material to all metal members.

SECTION 06100 - ROUGH CARPENTRY

2.4 DIMENSION LUMBER

- A. General: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.
- B. Non-Load-Bearing Interior Partitions: Provide framing of the following grade and species:
 - 1. Grade: No. 2.
 - 2. Species: Eastern softwoods; NELMA.
 - 3. Species: Northern species; NLGA.
 - 4. Species: Mixed southern pine; SPIB.
 - 5. Species: Western woods; WCLIB or WWPA.
 - 6. Species: Any species above.
- C. Exterior and Load-Bearing Walls: Provide framing of the following grade and species:
- D. Framing Other than Non-Load-Bearing Partitions: Provide framing of the following grade and species:
 - 1. Grade: No. 2.
 - 2. Species: Spruce-pine-fir south; NELMA.
 - 3. Species: Hem-fir north; NLGA.
 - 4. Species: Spruce-pine-fir north; NLGA.
 - 5. Species: Mixed southern pine; SPIB.
 - 6. Species: Hem-fir; WCLIB or WWPA.
 - 7. Species: Any species above.

2.5 BOARDS

- A. Exposed Boards: Where boards will be exposed in the finished work, provide the following:
 - 1. Moisture Content: 19 percent maximum.
 - 2. Species and Grade: Spruce-pine-fir, C & Btr per WCLIB rules or C Select per NLGA or WWPA rules.
 - 3. As noted on plans by Architect.
- B. Concealed Boards: Where boards will be concealed by other work, provide lumber with 19 percent maximum moisture content and of following species and grade:
 - 1. Species and Grade: Eastern softwoods, No. 3 Common per NELMA rules.
 - 2. Species and Grade: Mixed southern pine, No. 2 per SPIB rules.
 - 3. Species and Grade: Spruce-pine-fir, Standard per WCLIB rules or No. 3 Common per WWPA rules.
 - 4. Species and Grade: Western woods, Standard per WCLIB rules or No. 3 Common per WWPA rules.
 - 5. Species and Grade: Any species above.

SECTION 06100 - ROUGH CARPENTRY

2.6 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.7 ENGINEERED WOOD PRODUCTS

- A. General: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that evidence compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, 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. Laminated-Veneer Lumber: Lumber manufactured by laminating wood veneers in a continuous press using an exterior-type adhesive complying with ASTM D 2559 to produce members with grain of veneers parallel to their lengths and complying with the following requirements:
 - 1. Extreme Fiber Stress in Bending: 2500 psi (17 MPa) for 12-inch nominal- (286-mm actual-) depth members.
 - 2. Modulus of Elasticity: 2,000,000 psi (13 800 MPa).
 - 3. Tension Parallel to Grain: 1850 psi (13 MPa).
 - 4. Compression Parallel to Grain: 2800 psi (19 MPa).
 - 5. Compression Perpendicular to Grain: 400 psi (3 MPa) perpendicular to and 500 psi (3.5 MPa) and parallel to glue line.
 - 6. Horizontal Shear: 285 psi (2 MPa) perpendicular to and 190 psi (1.3 MPa) parallel to glue line.
- C. Prefabricated Wood I-Joists: Units manufactured by bonding stress-graded lumber flanges to wood-based structural-use panel webs with exterior-type adhesives complying with ASTM D 2559, to produce I-shaped joists complying with the following requirements:
 - 1. Flange Material: Laminated-veneer lumber.
 - 2. Web Material: Oriented-strand board (OSB) complying with DOC PS 2.

SECTION 06100 - ROUGH CARPENTRY

3. Web Material: Plywood complying with DOC PS 2.
4. Web Material: Either material indicated above, as standard with joist manufacturer.
5. Structural Capacities: Establish and monitor structural capacities according to ASTM D 5055.
6. Sizes: Depths and widths as indicated, with flanges not less than 1-1/2 inches (38 mm) in actual width.
7. I-Joists shall be installed with all required anchors, stiffeners and bracing in accordance with manufacturer requirements.

2.8 CONCEALED, PERFORMANCE-RATED STRUCTURAL-USE PANELS

- A. General: Where structural-use panels are indicated for the following concealed types of applications, provide APA-performance-rated panels complying with requirements designated under each application for grade, span rating, exposure durability classification, and edge detail (where applicable).
 1. Thickness: Provide panels meeting requirements specified but not less than thickness indicated.
 2. Span Ratings: Provide panels with span ratings required to meet "Code Plus" provisions of APA Form No. E30V, "APA Design/Construction Guide: Residential & Commercial."
- B. Subflooring: APA-rated sheathing.
 1. Exposure Durability Classification: Exposure 1.
 2. Span Rating: 48/24.
 3. Minimum thickness: 5/8 inch.
 4. Floor sheathing shall be tongue and groove and installed with both construction adhesive and required nailing.
- C. Wall Sheathing: APA-rated sheathing.
 1. Exposure Durability Classification: Exposure 1.
 2. Span Rating: As required to suit stud spacing indicated.
 3. Minimum thickness indicated on plan.
- D. Roof Sheathing: APA-rated sheathing.
 1. Exposure Durability Classification: Exterior, Structural I, Exposure 1.
 2. Minimum Span Rating: 32/16.
 3. Minimum thickness: 3/4 inch.
 4. Roof sheathing shall be installed with panel clips.

2.9 STRUCTURAL-USE PANELS FOR BACKING

- A. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not otherwise indicated, not less than 15/32 inch (11.9 mm) thick.

SECTION 06100 - ROUGH CARPENTRY

2.10 AIR-INFILTRATION BARRIER

- A. Air retarder complying with ASTM E 1677; made from polyolefins; either cross-laminated films, woven strands, or spunbonded fibers; coated or uncoated; with or without perforations to transmit water vapor but not liquid water; and as follows:
 - 1. Minimum Thickness: 3 mils (0.08 mm).
 - 2. Minimum Water-Vapor Transmission: 10 perms (575 ng/Pa x s x sq. m) when tested according to ASTM E 96, Procedure A.
 - 3. Maximum Flame Spread: 25 per ASTM E 84.
 - 4. Minimum Allowable Exposure Time: 3 months.

2.11 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.
- 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 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- G. All fasteners to secure pressure treated lumber/plywood shall be Type 304 Stainless Steel.

2.12 METAL FRAMING ANCHORS

- A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated and as follows:
 - 1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence 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

SECTION 06100 - ROUGH CARPENTRY

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, G60 (ASTM A 653M, Z180) coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.
- C. Joist Hangers: U-shaped joist hangers with 2-inch- (50-mm-) long seat and 1-1/4-inch- (32-mm-) wide nailing flanges at least 85 percent of joist depth.
 - 1. Thickness: 0.064 inch (1.6 mm).
- D. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
 - 1. Strap Width: 2 inches (50 mm).
 - 2. Thickness: 0.064 inch (1.6 mm).
- E. Bridging: Rigid, V-section, nailless type, 0.064 inch (1.6 mm) thick, length to suit joist size and spacing.
- F. Rafter Tie-Downs (Hurricane Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-5/8 inches (41 mm) wide by 0.052 inch (1.3 mm) thick minimum. Tie-Downs must be selected to meet uplift forces as calculated in the wood truss design.

2.13 THERMO-PLY SHEATHING

- A. Standard Grade – Green, 0.78" for use in attic to secure under truss rafter for supporting glass fiber insulation board.
- B. Pre-cut to 24" wide strip for easy field installation.
- C. Perm Rating: Minimum 0.63.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
- C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Apply field treatment complying with AWP A M4 to cut surfaces of preservative-treated lumber and plywood.

SECTION 06100 - ROUGH CARPENTRY

- E. Comply with applicable recommendations contained in APA Form No. E30V, "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.
 - 2. Roof sheathing shall be installed with 1/8" spacing at all edge and end joints for expansion per APA recommendations in above-referenced guide.
- F. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. CABO NER-272 for power-driven staples, P-nails, and allied fasteners.
 - 2. Published requirements of metal framing anchor manufacturer.
 - 3. "Recommended Nailing Schedule" of referenced framing standard and with AFPA's "National Design Specifications for Wood Construction."
 - 4. "Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- G. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.
- H. Use double hot-dip galvanized or stainless-steel nails where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity.
- I. Countersink nail heads on exposed carpentry work and fill holes with wood filler.

3.2 WOOD FRAMING, GENERAL

- A. Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Install framing members of size and at spacing indicated.
- D. Do not splice structural members between supports.
- E. Firestop concealed spaces of wood-framed walls and partitions at each floor level and at ceiling line of top story. Where firestopping is not inherent in framing system used, provide closely fitted wood blocks of 2-inch nominal- (38-mm actual-) thickness lumber of same width as framing members.

3.3 THERMO-PLY SHEATHING:

- A. Provide conceal envelope in attic to support board insulation and to act as a vapor barrier.

SECTION 06100 - ROUGH CARPENTRY

- B. Pre-cut 24" wide strip to secure under wood truss rafter. Cut edge to clear truss web member.
- C. Tape joint between rafter without wood backing.

3.4 AIR-INFILTRATION BARRIER

- A. Cover sheathing with air-infiltration barrier as follows:
 - 1. Apply air retarder to comply with manufacturer's written instructions.
 - 2. Apply air-infiltration barrier to cover upstanding flashing with 4-inch (100-mm) overlap.

END OF SECTION 06100

SECTION 06651 - SOLID SURFACE WINDOWSILLS AND COUNTERTOPS

1.1 SUMMARY

- A. Section Includes solid surfacing fabrication including but not limited to the following:
 - 1. Solid Surface windowsill and Apron.

1.2 SUBMITTALS

- A. Product Data: For countertop materials and sinks.
- B. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section 01300. Indicate plans, sections, dimensions, component sizes, edge details, thermosetting requirements, fabrication details, attachment provisions, sizes of furring, blocking, including concealed blocking and coordination requirements with adjacent work. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacles and other items installed in the solid surface.
- C. Samples: For each type of material exposed to view.

1.01 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installers: Provide work of this Section executed by competent installers with minimum 5 years' experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
- B. Mock-Ups:
 - 1. Prior to final approval of Shop Drawings, erect 1 full size mock-up of each component at Project site demonstrating quality of materials and execution for Architect review.
 - 2. Should mock-up not be approved, rework or remake until approval is secured. Remove rejected units from Project site.
 - 3. Approved mock-up will be used as standard for acceptance of subsequent work.
 - 4. Approved mock-ups may remain as part of finished work.

1.02 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements: Deliver no components to Project site until areas are ready for installation.
- B. Storage and Handling Requirements:
 - 1. Store components indoors prior to installation.
 - 2. Handle materials to prevent damage to finished surfaces.

SECTION 06651 - SOLID SURFACE WINDOWSILLS AND COUNTERTOPS

1.03 WARRANTY

- A. Manufacturer Warranty: Provide manufacturer's standard warranty for material only for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Architect and at no expense to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer List: Products of the following manufacturers are acceptable subject to conformance to requirements of the Drawings, Schedules and Specifications:
 - 1. Corian;
 - 2. Meganite;
 - 3. Wilsonart Contract;
 - 4. Or approved equal

2.2 SOLID SURFACE MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
 - 1. Type: Provide Standard type unless Special Purpose type is indicated.
 - 2. Colors and Patterns: As selected by Architect from manufacturer's full range.
- B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.3 FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WT's "Architectural Woodwork Standards."
- B. Configuration:
 - 1. Front: Eased square edge with separate apron
 - 2. End Splash: Matching backsplash.
- C. Countertops: 1-inch-thick, solid surface material with radius edge built up with same material].
- D. Joints: Fabricate countertops without joints.

SECTION 06651 - SOLID SURFACE WINDOWSILLS AND COUNTERTOPS

2.4 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 - 1. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 2. Verify actual site dimensions and location of adjacent materials prior to commencing work.
 - 3. Examine cabinets upon which counter tops are to be installed. Verify cabinets are level to within 1/8" in 10' - 0".
 - 4. Notify Architect in writing of any conditions which would be detrimental to installation.
- B. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

- A. Install components plumb, level, rigid, scribed to adjacent finishes in accordance with reviewed Shop Drawings and Product installation details.
- B. Fabricate field joints using manufacturer's recommended adhesive, with joints being inconspicuous in finished work. Exposed joints/seams are not permitted. Keep components and hands clean when making joints. Reinforce field joints as specified herein. Cut and finish component edges with clean, sharp returns.
- C. Route radii and contours to template. Anchor securely to base component or other supports. Align adjacent components and form seams to comply with manufacturer's written recommendations using adhesive in color to match work. Carefully dress joints smooth, remove surface scratches and clean entire surface.
- D. Install countertops/sills with no more than 1/8" sag, bow or other variation from a straight line.
- E. Seal between wall and components with joint sealant as specified herein and in Section 07920, as applicable.
- F. Provide endsplashes as indicated on Drawings. Adhere to countertops using a standard color-coordinated silicone sealant. Adhere applied sidesplashes to countertops using a standard color-matched silicone sealant. Provide sidesplashes at walls and adjacent millwork. Fabricate radius

SECTION 06651 - SOLID SURFACE WINDOWSILLS AND COUNTERTOPS

cove at intersection of counters with backsplashes to dimensions shown on reviewed Shop Drawings. Adhere to countertops using manufacturer's standard color-coordinated joint adhesive.

- G. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Ensure components are clean on date of Substantial Completion of the Work.

3.3 REPAIR

- A. Repair minor imperfections and cracked seams and replace areas of severely damaged surfaces in accordance with manufacturer's instructions.

3.4 SITE QUALITY CONTROL

- A. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Architect at no cost to Owner.

3.5 CLEANING

- A. Remove excess adhesive and sealant from visible surfaces.
- B. Clean surfaces in accordance with manufacturer's instructions.

3.6 PROTECTION

- A. Provide protective coverings to prevent physical damage or staining following installation for duration of construction phase.
- B. Protect surfaces from damage until date of Substantial Completion of the Work.

END SECTION 06651

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. The water repellent 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 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.

1.3 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.

SECTION 07200 - WATER REPELLENTS (For Brick Veneer & Concrete Masonry Unit)

- E. Coordination with Sealants: Do not apply water repellent until sealants have been installed and cured.
- 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.
- I. LOCATION: The following areas are to be coated by this product.
 - 1. All new brick, CMU and Cast Stone veneer work

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.
 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).

SECTION 07210-BUILDING INSULATION

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 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE 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 Moisture Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air Moisture Barrier Accessory: A transitional component of the air moisture barrier that provides continuity.
- C. Air Moisture 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):

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

1. AMMA 2400-02, Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction

B. American Society for Testing and Materials (ASTM):

1. ASTM 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

1.4 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 moisture barrier coincides

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

with installation of substrate preparation without causing delay to the Work. Do not install until the temperature is 32 degrees F and rising. Do not install on frozen materials.

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 moisture barriers.
3. Air/moisture 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.

1.5 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 Moisture Barrier manufacturer's guide specification.
 - c. Air Moisture Barrier manufacturer's complete set of technical data sheets for assembly.
 - d. Air Moisture Barrier manufacturer's complete set of standard detail drawings.
2. Shop Drawings: For air-barrier assemblies.
 - a. Show locations and extent of air moisture 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 moisture 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 moisture 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.

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

- 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 moisture barrier manufacturer.
6. Statement that installing contractor is authorized by air moisture 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.

1.6 QUALITY ASSURANCE

A. Single Source Responsibility:

1. Obtain fluid-applied membrane air moisture barrier, transition membranes, air moisture barrier sealants, primers, mastics, and adhesives from a single air moisture 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. The Contractor shall demonstrate qualifications to supply materials of this section by certifying the following:
 - a. Air Moisture 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 moisture 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.

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

2. Maintain one (1) copy of air moisture barrier manufacturer's instructions on site.
3. At all times during the execution of the Work allow access to site by the air moisture barrier manufacturer representative.
- 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. Contractor is responsible for all site safety requirements. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.

1.7 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: The 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 moisture 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.

1.8 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.

1.9 PERIODIC INSPECTION BY MANUFACTURER'S REPRESENTATIVE

- A. When the project is in progress, the air moisture 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. The Contractor shall correct any unacceptable practices in order to comply with the manufacturer's instructions.

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

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.

1.10 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 moisture barrier manufacturer and product.

B. Storage of Materials:

1. Store materials as recommended by the air moisture 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 moisture barrier manufacturer published literature.
7. Store material at 40 degrees F or warmer.

C. Handling:

1. Refer to air moisture barrier manufacturer's published literature.

1.11 SITE CONDITIONS

A. Environmental Requirements:

1. No work shall be performed during rain or inclement weather.
2. No work shall be performed on frost or wet covered surfaces.

B. Protection:

1. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane.
2. Completely cover walls before and after installation. Do not allow walls to become wet.

C. Ensure all preparation Work is completed prior to installing fluid-applied membrane air moisture barrier.

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

1.12 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

- A. Components and auxiliary materials must be obtained as a single source from the assembly the Contractor to ensure total system compatibility and integrity.
- B. Basis of Design (Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.)
 - 1. Henry Company
 - 2. 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 Moisture 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 or approved equal
 - b. Color: Graphite
 - c. Solids Content:
 - 1) By Weight: 63%
 - 2) By Volume: 53%
 - d. Service Temperature:
 - 1) Low Temperature: -40 degrees F (-40 degrees C)
 - 2) High Temperature: +180 degrees F (+80 degrees C)
 - e. Application Temperature:

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

- 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/ft2 (0.0005 L/s.m2)
- 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 or approved equal
 - b) Color: Blue
 - c) Air Leakage (ASTM E2178): <0.004 L/s/m² @ 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
 - g) Nail Sealability (AMMA 711): Pass
 - h) Surface Burning Characteristics (ASTM E84):
 - 2) Class A

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

- 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 or approved equal
 - 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/m² @ 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 moisture 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 or approved equal
 - 2) Color: Blue
 - 3) Air Leakage (ASTM E2178): <0.02 L/s/m² @ 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
 - 9) Tensile Strength (ASTM D828): 182N MD/129N CD
 - 10) Cycling and Elongation (ICC-ES AC48): Pass

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

3. Adhesives and Primers:
 - a. Spray adhesive, and having the following properties:
 - 1) Basis of Design Product: Blueskin Spray Prep or approved equal
 - 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 or approved equal.
 - 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 or approved equal
 - 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 or approved equal
 - 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 the air moisture barrier manufacturer
 - c. Contact the air moisture barrier manufacturer for a complete list of authorized sealants.

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

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 or approved equal
 - 2) Color: Yellow
 - 3) High Temperature Stability - Flow Resistance (ASTM D5147): Pass
 - 4) Air leakage (ASTM E283): 0.005 L/s.m² @ 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 Moisture Barrier Manufacturer published literature prior to installation of fluid applied membrane air moisture barrier assembly.
 2. Sheathing panels must be securely fastened and installed flush to ensure a continuous substrate in accordance with Air Moisture 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 moisture 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 the Owner in writing of any conditions that are not acceptable.
- C. The Contractor shall examine and determine that surfaces and conditions are ready to accept the Work of this section in accordance with the manufacturer's recommendations. Commencement of work or any parts thereof shall mean acceptance of the substrate.

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

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 moisture 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 moisture barrier to substrate.
 - b. Allow fluid applied membrane air moisture barrier to fully cure prior to subsequent application.
 - c. Install primary fluid applied membrane air moisture barrier to Air Moisture Barrier Manufacturer minimum recommended mil thickness.
 - 2. Two coat:
 - a. Apply fluid applied membrane air moisture barrier to achieve one-half (1/2) of Air Moisture Barrier Manufacturer minimum recommended mil thickness.
 - b. Allow fluid applied membrane air moisture barrier to fully cure prior to subsequent application.
 - c. Apply fluid applied membrane air moisture barrier to achieve one-half (1/2) of Air Moisture Barrier Manufacturer minimum recommended mil thickness.
 - d. Overall dry mil thickness shall be in accordance with Air Moisture Barrier Manufacturer published literature.

3.3 INSTALLATION

- A. Ensure substrate is ready to receive fluid applied membrane air moisture barrier in accordance with published literature.
- B. Do not store material under 40 degrees F. Do not use any material that froze.
- C. Fluid applied membrane air moisture barrier shall not be applied when ambient (air) and substrate temperatures are below 32 degrees F. Do not apply in freezing conditions.
- D. Do not proceed with application of air moisture barrier membrane when rain is expected within 16 hours.

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

- 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 the air moisture 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 the air moisture 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 the air moisture barrier manufacturer
 - 2) Apply liquid applied flashing in accordance with the air moisture 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 Moisture 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 the air moisture barrier manufacturer.
- G. Refer to Drawings and air moisture barrier manufacturer requirements for installation procedures including, but not limited to, the following:

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

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 the air moisture barrier manufacturer to coordinate transition of fluid applied membrane air moisture barrier to adjacent areas including, but not limited to, the following:
1. Roof to air moisture barrier
 2. Air moisture 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 04210 - Unit Masonry
 2. Provide drip plate as indicated.
- J. Primary Liquid Air Moisture Barrier Membrane
1. Install fluid applied membrane air moisture barrier in accordance with the air moisture barrier manufacturer published literature to ensure an air and watertight fluid applied membrane air moisture barrier assembly.
 2. Fluid applied membrane air moisture 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 moisture barrier.
 3. Install fluid applied membrane air moisture barrier and transition membranes so that subsequent membrane installation laps one (1) inch (2.5 cm) onto existing

SECTION 07272 – FLUID-APPLIED MEMBRANE AIR MOISTURE BARRIERS

membrane ensuring an air and watertight fluid applied membrane air moisture barrier assembly.

4. Fluid applied membrane air moisture barrier total dry thickness shall be in accordance with air moisture barrier manufacturer published literature. Refer to the Air Moisture Barrier Manufacturer Technical Data Sheet.

3.4 FIELD QUALITY CONTROL

A. Final Observation and Verification:

1. Final inspection of fluid applied membrane air moisture barrier assembly shall be carried out by the Owner's representative, the contractor, and the air moisture barrier manufacturer representative.
2. Contact the air moisture barrier manufacturer for warranty issuance requirements.

B. Fluid applied membrane air moisture barrier assembly is not designed for permanent UV exposure. Refer to the air moisture 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 the installation.
- C. Check area to ensure cleanliness and remove debris, equipment, and excess material from the site.

END OF SECTION

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 wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Preconstruction field test reports.
- D. Compatibility and adhesion test reports.
- E. Product 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 Owner 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. Tremco; Spectrem 1 (Basic).
 - c. 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. Tremco; Spectrem 2
 - c. Or approved equal.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 50.

SECTION 07920 - JOINT SEALANTS

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 200 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.
- H. Concrete plank floor joists. Provide Sikaflex – 1A Elastomeric Joint Sealant or approved equal.

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

SECTION 07920 - JOINT SEALANTS

approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

- 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.

SECTION 07920 - JOINT SEALANTS

2. Remove laitance and form-release agents from concrete.
 - a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
 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,

SECTION 07920 - JOINT SEALANTS

uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- G. Installation of Preformed Silicone-Sealant System: Comply with manufacturer's written instructions.
- H. 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 (WIDE STILE)

PART 1 - GENERAL

1.1 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.

1.2 QUALITY ASSURANCE

- A. MANUFACTURER'S CERTIFICATION: Manufacturer is to have a minimum of five (5) years of 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.

1.3 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

SECTION 08100 – FRP FIBERGLASS DOORS (WIDE STILE)

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.
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.

1.4 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.
3. Submit two samples of each door stile classification that shows rails, stiles, core, joint construction, edge trim and closer reinforcing for color section if requested by the Construction Manager or Owner.
4. Submit small samples of the FRP face sheets for color section.

B. TEST REPORTS: Provide the current test reports with the shop drawing submittal.

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.

SECTION 08100 – FRP FIBERGLASS DOORS (WIDE STILE)

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. IDENTIFICATION: Each door and frame will be tagged with a mark or number which correlates with the designation system used for shop drawings.
- B. PROTECTION: All materials will be protected during transit and storage from soiling and deterioration.

PART 2 – PRODUCTS

2.1 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.
- B. Products are to be from FRP Architectural Doors, Inc Series Heavy Wall FD55 or Glass Enterprises GEF50 or approved equal. FRP doors must incorporate Kemlite RFP face sheet with extended U/V protection 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.

2.3 ALUMINUM FRAMES & CLADDING:

- A. Structural Main Frame – doors have an aluminum main frame constructed from extruded aluminum 6063-T6 alloy. Doors are 1-3/4" thick. Main frame tube is to be a single extruded unit measuring 1-1/2" x 5-1/2" on both stiles, with a 6" top rail, and a 2-1/2" bottom rail.
- B. Main Frame wall thickness:
 - 1. Side Stiles – Minimum 3/16" thick hinge edge wall.
 - 2. Top and Bottom Rails – Minimum 1/8" thick outside edge wall.
 - 3. All Rails and Stiles – Minimum 1/8" thick face walls.
 - 4. All Rails and Stiles – Minimum 1/8" thick inside edge wall.

SECTION 08100 – FRP FIBERGLASS DOORS (WIDE STILE)

- C. Main Frame Joinery – Assembly for the meeting joints of the rails and stiles on the main frame are to be Mortise and Tenon on all four joints.
- D. Face Sheets – face sheets will be fiberglass reinforced with extended U.V. protection, polymer, .120” thick, and have a pebble like embossed finish manufactured by Kemlite or approved equal.
- E. Core Material – Insulated 5 lb. Urethane Injection Core with the option of 25 psi Polystyrene Core.
- F. Interloc Edge Trim – all aluminum trim is completely removable. All parts of the door are replaceable and repairable in the field. No fastening devices are exposed on the stile edge trims.
- G. Hardware Reinforcing – Closer reinforcing is built in to the 6” Header. Other surface applied hardware is reinforced with the standard 5-1/2” main frame tube with a wall thickness of 1/8”. Reinforcing for mortise and concealed hardware is to be done per template requirements.
- H. Weatherstripping – Center stiles of pairs will have pile weatherstripping .5” backing width and .5” pile height.
- I. Vision Lites – Trim moldings will be aluminum extrusion – 6063-T5 alloy and removable from the inside only. Door vision lites will be factory glazed for ¼” or 1” thick glass as per the construction documents. Lite kits are by Glass Enterprises Inc. or approved equal.
- J. Recessed Flush Pulls – Pull handle is 6” x 7-1/2” x 1-9/16” manufactured from all extruded aluminum 6063-T6 alloy. Unit is welded together. Pull will be finished to match door edge trim or as specified. Pull is to be secured to main frame of door without any of the fastening devices exposed to the fingers when hand is inserted into pull to open door. Pull is to be supplied and installed at the factory by Glass Enterprises Inc. or approved equal. All necessary reinforcements and modifications to door for receiving the recessed flush pull is to be done in the factory.

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.

SECTION 08100 – FRP FIBERGLASS DOORS (WIDE STILE)

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".

PART 3 – EXECUTION

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.
- 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.

SECTION 08100 – FRP FIBERGLASS DOORS (WIDE STILE)

- I. INSTALLERS ARE TO CLEAN up every day leaving area in a safe and usable condition.

END OF SECTION 08100

SECTION 08105- STEEL FRAMES

1.2.1.1 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.

SECTION 08211 - FLUSH WOOD DOORS

- c. Staining: Match Architect's sample or existing buildings' 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 08412 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Special Conditions and other Division 0 and Division 1 Project Manual Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

- A. This Section Includes:
 - 1. Exterior manual-swing entrance doors and door-frame units.

1.3 DEFINITIONS

- A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
 - 1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
 - 2. Dimensional tolerances of building frame and other adjacent construction.
 - 3. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferring to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - d. Noise or vibration created by wind and by thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
 - g. Failure of operating units.
- B. Structural Loads:
 - 1. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7-16 "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.
 - 2. Seismic Loads: IBC 2018, NJ Edition.
 - 3. Design wind load velocity at the project site is 100 mph

SECTION 08412 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

4. Importance factor is 1.15
 5. Exposure category is "C"
- C. Deflection of Framing Members:
1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed $L/240 + \frac{1}{4}$ " at openings greater than 13'6" and shall not exceed $L/175$ at openings lesser than 13'6" of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to $\frac{3}{4}$ inch (19 mm), whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to $L/360$ of clear span or $\frac{1}{8}$ inch (3.2 mm), whichever is smaller.
- D. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits. The maximum wind load design pressure for this project is 35 psf.
 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.
- E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft. (75 Pa).
- F. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa). The storefront systems shall have a maximum no leakage water performance of 12 psf.
- G. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. 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.
 2. Interior Ambient-Air Temperature: 75 deg F (24 deg C).
- H. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 57 for the framing when tested according to AAMA 1503-98.
- I. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.55 Btu/sq. ft. x h x deg F (3.92 W/sq. m x K) when tested according to AAMA 1503-98.

SECTION 08412 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.
- B. Shop Drawings: For aluminum-framed storefront and door systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
 - 2. Submit to architect approved shop drawings for Structural Stamp & Calculations provided by Professional Engineer registered in the state of New Jersey for all local jurisdiction codes and wind velocities indicated. Calculations shall indicate the adequacy of the storefront and curtain wall systems perimeter anchors & attachments and the structural integrity of the fenestration system framing members. The final shop drawings must be readable for field personnel to use as an installation guideline regarding fastener type and locations.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:
 - 1. Joinery, including concealed welds.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Glazing.
 - 5. Flashing and drainage.
- F. Other Action Submittals:
 - 1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
- G. Qualification Data: For qualified Installer.
- H. Welding certificates.
- I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

SECTION 08412 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

- J. Source quality-control reports.
- K. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.
- L. Warranties: Submit a copy of the Manufacturer's Special Ten (10) year Warranty.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative is to verify installation contractor's approval for ability to complete installation of units required for this Project.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not revise intended aesthetic effects as judged solely by the architect, except with architect's approval. If revisions or substitutions are proposed, submit comprehensive explanatory data to architect within thirty (30) days of Notice to Proceed per Specification Section 01300, "Submittals". After thirty (30) days, no substitution products will be considered.
 - 2. No stock length materials will be allowed for this project. All materials are to be factory fabricated by the manufacturer at their facility in order to be utilized for this project
- C. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- D. Single-Source Responsibility: Provide windows, storefront, entrance doors, and related fenestration system sections, as well as all necessary accessories from one source and produced by a single manufacturer.
- E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Field testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

SECTION 08412 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of metals, other materials, & metal finishes beyond normal weathering.
 - e. Failure of insulating glass.
 - f. Noise or vibration caused by thermal movement
 - g. Water Leakage through fixed glazing and framing areas
 - 2. Warranty Period: Ten (10) years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

- A. Entrance Door Hardware:
 - 1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
 - 2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

SECTION 08412 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. EFCO Corporation
 - 2. YKK AP America, Inc.
 - 3. Wausau Window & Wall Systems.
 - 4. Oldcastle Building Envelope Systems.
 - 5. Or approved equal.
- B. Basis of Design Products: Subject to compliance with requirements, provide EFCO products; series 401, 402, & 403 storefronts and entrance packages inclusive of series D500 entrance doors OR YKK AP products; series YES 45 TU (for Exterior) and YES 45 FI (for Interior) storefronts and entrance packages inclusive of series 50D Wide Stile Doors. (Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.)

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 - 4. Structural Profiles: ASTM B 308/B 308M.
 - 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

2.3 FRAMING SYSTEMS

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: storefront systems are screw spline construction.
 - 2. Glazing System: Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane: As indicated on architectural drawings.
- B. Framing Members, General:
 - 1. All storefront members shall have a minimum wall thickness of .080". The face dimension for the storefront system will be not less than 2" and the frame depth will not be less than 4 ½". All exposed work shall be carefully matched to produce continuity of line and design with all joints. System design will be such that raw edges will not be visible at joints.
 - 2. EFCO Model D500 Entrance Doors and 401, 402 & 403 Storefront, or approved equal. No stocklength materials will be allowed for this project. All materials are to be factory fabricated by the manufacturer at their facility in order to be utilized for this project.

SECTION 08412 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

3. Any manufacturer bidding this project with their storefront systems must provide their own internal steel reinforcement members as required to meet the project wind load design criteria and a maximum of 35 psf wind load design pressure.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
- D. Fasteners and Accessories: Provide nonmagnetic stainless steel or ceramic coated fasteners warranted by the fenestration system installer to be non-corrosive and accessories compatible with adjacent materials.
 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 2. Reinforce members as required to receive fastener threads.
- E. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.
- F. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.
- G. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

2.4 ACCESSORY MATERIALS

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."
- B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil (0.762-mm) thickness per coat.

2.5 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.
 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 4. Physical and thermal isolation of glazing from framing members.

SECTION 08412 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
1. At exterior doors, provide compression weather stripping at fixed stops.
 2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- F. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.6 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designing finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. High Performance Organic Finish: AA-C12C42R1X (Chemical Finish: Cleaned & inhibitive chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
1. Fluoropolymer two coat system: Manufacturer's standard two-coat, thermocured system consisting of specifically formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70% polyvinylidene fluoride resin by weight; complying with AAMA 2605. Architect is to select a custom color (non-metallic / non-exotic), which the fenestration system manufacturer can match 'in house'. Architect will select the custom color during the shop drawing review process.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

SECTION 08412 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 08 Section "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

3.3 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
2. Alignment:

SECTION 08412 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

- a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
 - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).
- B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified independent testing and inspecting agency to perform field tests and inspections.
- B. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
 - 1. Water Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
 - a. Test Area: A minimum area of 75 feet (23 m) by 1 story of aluminum-framed systems. Field Test to be in accordance with Test Method "A" under AAMA 501.2.
- C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports.

3.5 ADJUSTING

- A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.
 - 1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch, measured to the leading door edge.

3.6 CLEANING

- A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weather tight closure.
- B. Remove excess sealant and glazing compounds, and dirt from surfaces.

SECTION 08412 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

3.7 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08412

SECTION 08520 – ALUMINUM PROJECTION WINDOWS

PART 1 - GENERAL

1.1 General Requirements

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Special Conditions and other Division-0 and Division-1 Project Manual Sections, apply to this Section.

1.2 Section Includes

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the aluminum projection windows as shown on the Drawings and/or specified herein, including but not limited to, the following:
 - 1. Aluminum project in, project out, and fixed combination window systems.
 - 2. Anchors, hardware and accessories including panning, interior trim pieces and subframe / receptors.

1.3 Definitions

- A. AW: Architectural Grade; thermal break and glazing.
- B. Performance grade number, included as part of the ANSI/AAMA product designation code is actual design pressure in pounds force per square foot (pascals) used to determine structural test pressure and water test pressure.
- C. Structural test pressure, for uniform load structural test, is equivalent to 150 percent of design pressure.
- D. Minimum test size is smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.4 Performance Requirements

- A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of test size indicated below:
 - 1. Minimum size required by ANSI/AAMA 101/1.5.2-97.
- B. ANSI/AAMA 101-97 Performance Requirements: Provide aluminum windows of the performance class and grade indicated that comply with ANSI/AAMA 101-97.
 - 1. Performance Class: AW
 - 2. Performance Grade: Minimum for performance class indicated. (120)
 - 3. Testing performed according to ANSI/AAMA 101-97, Uniform Load Deflection Test ASTM E 330.
- C. Structural Performance: Provide aluminum windows capable of withstanding the following, including wind loads based on IBC 2021 NJ Edition, ASCE 7-16 (minimum design loads for buildings and other structures), and passing ASTM E330, Uniform Load Structural Test, at basic wind speed indicated:

SECTION 08520 – ALUMINUM PROJECTION WINDOWS

1. Design Criteria:
 - a. Exposure: 'C'
 - b. Importance factor: 1.15
 - c. Wind load: 124 mph
 - d. SHEG II $A/v=0.10$
 - e. SPC C $A/a=0.10$
 2. The wind load design pressures for this project are 42 psf @ non-corner zones and 52 psf @ corner zones.
- D. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283, Air Infiltration Test.
1. Maximum Rate: 0.1 cfm/sq.ft. (2 cu. m/h x sq.m) of area at an inward test pressure of 6.24 lbf/sq.ft. (300 Pa).
- E. Water Resistance: No water leakage as defined in AAMA/NWWDA referenced test methods at a water test pressure equaling that indicated, when tested according to ASTM E 331/ASTM E 547, Water Resistance Test.
1. Test Pressure: 15 static air pressure difference of 15.0 psf.
- F. Condensation-Resistance Factor: Provide aluminum windows tested for thermal performance according to AAMA 1503 or per NFRC 100 simulation data, showing a minimum CRF of 73 for the frame.
- G. Thermal Transmittance: At both the Base Bid & Alternate Bid, window manufacturer to provide aluminum windows with a whole-window U-value maximum indicated at 15-mph (24-km/h) exterior wind velocity and winter condition temperatures when tested according to AAMA 1503 or per NFRC 100 simulation data.
1. U-Value: 0.47 Btu/sq.ft. X h x deg F (W/sq.m x K) for operable sash.
 2. U-Value: 0.37 Btu/sq.ft. X h x deg F (W/sq.m x K) for fixed frame.
- H. Thermal Movements: Provide aluminum windows, including anchorage, that accommodate thermal movements of units resulting from the following maximum change (range) in ambient and surface temperatures without buckling, distortion, opening of joints, failure of joint sealants, damaging loads and stresses on glazing and connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to solar heat gain and nighttime sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient.
- I. Projected Windows: Comply with ANSI/AAMA 101-97 for the following tests:
1. Torsion Test.
 2. Horizontal Concentrated Load Test on Latch Rail.
 3. Vertical Concentrated Load Test on Latch Rail.
 4. Torsion Load Test on Intermediate Frame Rails.
 5. Vertical Concentrated Load Test on Intermediate Frame Rails.
 6. Balance Arm Load Test.

SECTION 08520 – ALUMINUM PROJECTION WINDOWS

1.5 Submittals

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and the following:
 - 1. Mullion details, including reinforcement and stiffeners.
 - 2. Joinery details.
 - 3. Expansion provisions.
 - 4. Flashing and drainage details.
 - 5. Weather-stripping details.
 - 6. Thermal-break details.
 - 7. Glazing details.
 - 8. Internal Blinds and removable takeout panel.
 - 9. 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 and used to determine the following:
 - a. Structural test pressures and design pressures from basic wind speeds indicated.
 - b. Deflection limitations of glass framing systems.
- C. Samples for Initial Selection: For units with factory-applied color finishes. Architect reserves the right to choose from full color offerings for anodized finish. Color is to match Architects' sample.
- D. Samples for Verification: For aluminum window components required, prepared on Samples of size indicated below:
 - 1. Main Framing Member: 12-inch-(300-mm) long, full-size sections of extrusions with factory-applied color finish.
 - 2. Hardware: Full-size units with factory-applied finish.
 - 3. Weather Stripping: 12-inch-(300-mm) long sections.
 - 4. Architect reserves the right to require additional samples that show fabrication techniques, workmanship, and design of hardware and accessories.
- E. Qualification Data: For installer and testing agency.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency, for each operation and configuration of aluminum window. Test results based on use of down-sized AAMA standard test size units will not be accepted.
- G. Shop drawings shall be sealed by a state licensed structural engineer to assure all requirements in this specification and drawings are met. The final shop drawings must be readable for field personnel to use as an installation guideline regarding fastener type and fastener locations.
- H. Submit a copy of the Manufacturer's Special 10 year warranty.

SECTION 08520 – ALUMINUM PROJECTION WINDOWS

1.6 Quality Assurance

- A. Manufacturers Qualifications: Must have minimum 10 years of continuous fabrication of aluminum windows similar in design and scope to that which is required for this project. The window products supplied for this project must be produced and glazed by the same factory assembly line that the certified test window unit was produced. Any products fabricated by independent subcontractor organizations using “S.L.” stock length parts at their own factory or shop facilities will not be accepted. Field glazing is not permitted.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- D. Single Source Responsibility: Provide aluminum window units, related fenestration system sections, and all necessary accessories from one source and produced by a single manufacturer.
- E. For maximum performance, windows for this project must meet both the testing requirements stated herein and the minimum material requirements specified. Windows which carry the applicable AAMA rating but which do not meet the material thickness and depths are not acceptable for use on this project.
- F. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 1 Section “Product Requirements”.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect’s approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
 - 2. Provide AAMA certified aluminum windows.
 - 3. Do not revise intended aesthetic effects as judged solely by the architect, except with architect’s approval. If revisions or substitutions are proposed, submit comprehensive explanatory data to architect within thirty (30) days of Notice to Proceed per Specification Section 01300, “Submittals”. After thirty (30) days, no substitution products will be considered.
- G. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA’s “Glazing Manual” unless more stringent requirements are indicated.
- H. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section “Project Management and Coordination”. Review methods and procedures related to aluminum windows including, but not limited to, the following:
 - 1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.

SECTION 08520 – ALUMINUM PROJECTION WINDOWS

2. Review and finalize construction schedule and verify availability of materials. Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review required testing and inspecting procedures.

1.7 Project Conditions

- A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 Warranty

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 1. Failure to meet performance requirements.
 2. Structural failures including excessive deflection.
 3. Water leakage, air infiltration, or condensation.
 4. Faulty operation of movable sash and hardware.
 5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 6. Insulating glass failure.
- B. Warranty Period: ten (10) years for windows and insulated glass from date of Substantial Completion.
- C. Warranty Period for Metal Finishes: ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 Manufacturers

- A. Manufacturers: Subject to compliance with requirements, provide architectural grade thermal project-in, project out, and fixed combination windows, with minimum 4-1/2" frame depth, by one of the following or approved equal:
 1. Fixed Windows (all aluminum not less than 0.125 inches thick):
 - a. EFCO Corporation: Series 450X.
 - b. Oldcastle Building Envelope / Moduline-Model: Signature 16PL series.
 - c. Wausau Window and Wall Systems: Model 4250I.
 - d. Architectural Window Manufacturing Corporation Series 3400i
 2. Projected Windows (all aluminum not less than 0.125 inches thick):
 - a. EFCO Corporation: Series 450X.
 - b. Oldcastle Building Envelope / Moduline-Model: Signature 16PL series.
 - c. Wausau Window and Wall Systems: Model 4250I.
 - d. Architectural Window Manufacturing Corporation Series 3400i

SECTION 08520 – ALUMINUM PROJECTION WINDOWS

- B. The following specifications are based on EFCO Corporation, Series 450X (Enhanced Thermal Performance Window).

2.2 Materials: General

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength, not less than 16,000-psi (110-MPa) minimum yield strength, and not less than 0.125-inch (1.6-mm) thickness at any location for the main frame and sash members.
- B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.
 - 1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch (3.2-mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, non-corrosive, pressed-in, splined grommet nuts.
 - 2. Exposed Fasteners: Unless avoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member of hardware being fastened, as appropriate.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- D. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when aluminum window is closed.
 - 1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/NWWDA 101/I.S.2.
- E. Replaceable Weather Seals: Comply with AAMA 701/702.
- F. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.3 Glazing

- A. Base Bid Glass: Exterior glass lite comprised of ¼" standard bronze or grey tint tempered and interior glass lite comprised of ¼" clear tempered with Vitro "SB60" soft coat Low E @ #3 surface complying with Division 8 Section "Glazing". The air spacer cavity shall be Argon gas filled.
- B. Base Bid Glazing System: Manufacturer's standard "insulated glass" factory-glazing system that produces weather tight seal as indicated in Division 8 Section "Glazing".

SECTION 08520 – ALUMINUM PROJECTION WINDOWS

2.4 Hardware

- A. General: Provide manufacturer's standard hardware fabricated from, stainless steel, complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows and sized to accommodate sash or ventilator weight and dimensions. Cadmium-plated hardware is not permitted. Do not use aluminum in frictional contact with other metals. Where exposed, provide white bronze alloy and nonmagnetic stainless steel.
- B. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
- C. Projected Windows: Provide the following operating hardware:
 - 1. Hinge: 4 bar Anderberg Arm Hinge.
 - 2. Lock: Combination lever handle and cam-action lock with stainless steel operation arm. Operable sash at more than 6'0" off of finish floor should be provided with pole operated cam action locks. Each classroom with a pole operated sash should receive (1) one pole @ 6'0" length with wall mount clip.
 - 3. Limit Device: Concealed limit shim device; located on jamb of each ventilator. School District to provide Architect with final allowable clear opening dimensions.

2.5 Insect Screens

- A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Locate screens on inside of window and provide for each operable exterior sash or ventilator.
 - 1. Aluminum Tubular (extruded) Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows", Architectural C-24, or Monumental M-32 class.
 - 2. Comply with SMA 1004, "Specifications for Aluminum (extruded) Tubular Frame Screens for Windows", for minimum standards of appearance, fabrication, attachment of screen fabric, hardware, and accessories unless more stringent requirements are indicated.
- B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints, concealed fasteners, adjustable rollers, and removable PVC spline/anchor concealing edge of frame.
 - 1. Extruded-Aluminum or Aluminum Tubular Framing Sections and Cross Braces: Not less than 0.040-inch (1-mm) wall thickness.
 - 2. Finish: Match aluminum window frame finish.
- C. Aluminum Mesh Fabric: 18-by-16 (0.11 diameter) mesh of PVC-coated, alum mesh threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration in the following color. Comply with ASTM D 3656.
 - 1. Mesh Color: **Silver Gray**.

SECTION 08520 – ALUMINUM PROJECTION WINDOWS

- D. Wickets: Provide full hinge sash wickets or fixed mount screens, if required framed and trimmed for a tight fit and durability during handling.

2.6 Fabrication

- A. General: Fabricate aluminum windows, in sizes indicated, that comply with ANSI/AAMA 101-97 for performance class and performance grade indicated. Include a complete system for assembling components and anchoring windows.
- B. General: Fabricate aluminum windows, in sizes indicated, that comply with requirements and that meet or exceed ANSI/AAMA 101-97 performance requirements for the following window type and performance class. Include a complete system for assembling components and anchoring windows.
 - 1. Projected Windows: AW120.
- C. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.
- D. Thermally Improved Construction: All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
 - 1. The thermal barrier shall be thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions. Poured and debridged urethane thermal barriers shall not be permitted.
- E. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.
- F. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- G. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.
- H. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units to meet project wind loads. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Vertical side stacking between window units is permitted provided window system provides necessary structural values to meet project specific wind loads.
- I. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch (1.6-mm) thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units. Provide subframes capable of withstanding design loads of window units.

SECTION 08520 – ALUMINUM PROJECTION WINDOWS

- J. Exterior Panning: Provide exterior extruded panning system as indicated on architectural drawings as shown, of profile and dimensions indicated but not less than 0.062-inch thick extruded aluminum. Finish to match window units. Corners of the panning shall be factory mitered. Panning assembly shall not require the use of exposed fasteners. Panning shall be shipped KD and field assembled. A stainless steel corner alignment clip shall be provided for each joint. Clip shall be of such a design that after panning is installed, weather sealing or caulking will completely cover the clip. Back seal all panning frame joints to prevent water migration into frame cavity prior to installation.
- K. Interior Trim: Provide interior trim as indicated on architectural drawings as shown, of profile and dimensions indicated but not less than 0.050-inch thick extruded aluminum. Finish to match window units.
- L. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 8 Section “Glazing” and with ANSI/AAMS 101-88.

2.7 Finishes

- A. General: Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. Finish: Fluorocarbon 2 coat thermocured system, composed of specifically formulated inhibitive primer and fluorocarbon color topcoat containing not less than 70% PVFD resin by weight; comply with AAMA 2605. The color selected by Owner/Architect to be a custom color (non-metallic / non-exotic), which the window manufacturer can match. The architect will select the custom color during the shop drawing review process.

PART 3 - EXECUTION

3.1 Examination

- A. Examine openings, substrates, structural support, anchorage, and conditions with Installer present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate; coordination with wall flashings, vapor retarders, and other built-in components; operational clearances; and other conditions affecting performance of work.
 - 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand and other construction debris.
 - 2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76-mm) of opening.
 - 3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offset at joints.

SECTION 08520 – ALUMINUM PROJECTION WINDOWS

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

- A. General: Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components; Drawings; and Shop Drawings.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- E. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101-I.S.2.

3.3 Field Quality Control

- A. Testing Services; Testing and inspecting of installed windows shall take place as follows:
 - 1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502, Test Method A, B, by applying same test pressures required to determine compliance with AAMA/NWWDA 101/I.S.2 in Part 1 "Performance Requirements" Article.
 - 2. Testing Extent: Three (3) windows as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested immediately after installation.
 - 3. Test Reports; Shall be prepared according to AAMA 502.
- B. Remove and replace windows where test results indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.4 Adjusting

- A. Adjust operating sashes and ventilators, screens, hardware, operators, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

SECTION 08520 – ALUMINUM PROJECTION WINDOWS

3.5 Protection and Cleaning

- A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains or other contaminants immediately according to manufacturer's written recommendations.
- B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt and other substances.
- C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove non-permanent labels and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.6 Demonstration

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system. Refer to Division 1 Section "Closeout Procedures".

END OF SECTION 08520

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

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 LLC

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
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

SECTION 08710 - DOOR HARDWARE

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
 - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - b. 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.
 - 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.

SECTION 08710 - DOOR HARDWARE

- 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
 - 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.

SECTION 08710 - DOOR HARDWARE

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 UL LLC, Intertek Testing Services, or other testing and inspecting organizations 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.

SECTION 08710 - DOOR HARDWARE

4. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in "REFERENCES" article 08710, 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.

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.

SECTION 08710 - DOOR HARDWARE

- 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.

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.
 - a. Mechanical Warranty
 - 1) Locks
 - a) Schlage L Series: 10 years
 - b) Schlage ND Series: 10 years
 - c) Or approved equal
 - 2) Exit Devices
 - a) Von Duprin: 10 years
 - b) Or approved equal
 - 3) Closers
 - a) LCN 4000 Series: 30 years
 - b) Or approved equal
 - b. Electrical Warranty
 - 1) Exit Devices
 - a) Von Duprin: 3 years
 - b) Or approved equal

SECTION 08710 - DOOR HARDWARE

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. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.
- B. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01300.
- 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.

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.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
 - 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

SECTION 08710 - DOOR HARDWARE

C. Cable and Connectors:

1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
2. Provide Molex (or approved equal) connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Ives 5BB series
 - b. Or approved equal
2. Acceptable Manufacturers and Products:
 - a. Hager BB1191/1279 series
 - b. Best FBB series
 - c. 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. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - 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

SECTION 08710 - DOOR HARDWARE

9. 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
 - b. Or approved equal
2. Acceptable Manufacturers:
 - a. Select
 - b. Best
 - c. Hager
 - d. 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
 - b. Or approved equal
2. Acceptable Manufacturers and Products:
 - a. ABH PT1000
 - b. Security Door Controls PTM
 - c. Precision EPT-12C
 - d. Or approved equal

SECTION 08710 - DOOR HARDWARE

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.

2.06 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
 - b. Or approved equal
2. Acceptable Manufacturers:
 - a. Burns
 - b. DCI
 - c. Trimco
 - d. Or approved equal

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.07 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage L9000 series
 - b. Or approved equal
2. Acceptable Manufacturers and Products:
 - a. Accurate 9000/9100 series
 - b. Best 45H series
 - c. 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.

SECTION 08710 - DOOR HARDWARE

2. Indicators: Where specified, provide indicator window measuring a minimum 2-3/5-inch x 3/5 inch with 180-degree visibility. Provide messages color-coded using ANSI Z535 Safety Red with full text and/or symbols, as scheduled, for easy visibility. When applicable allows for lock status indication on both sides of the door.
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. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
7. 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. (KEY OVERRIDE OPTION WHEN XL13-439 IS SPECIFIED IN HARDWARE SETS)
Provide locks with a key override feature built into the chassis that allows the outside key to retract the deadbolt and/or latchbolt, overriding the inside thumbturn when it is being held in the locked position.
9. 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. Vandlgard (or approved equal): Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
 - b. Lever Design: <INSERT LEVER DESIGN>.

2.08 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage ND series
 - b. Or approved equal
2. Acceptable Manufacturers and Products:
 - a. Best 9K series
 - b. Sargent 11-Line
 - c. or approved equal

SECTION 08710 - DOOR 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. Indicators: Where specified, provide escutcheon with lock status indicator window on top of lockset rose:
 - a. Escutcheon height (including rose) 6.05 inches high by 3.68 inches wide.
 - b. Indicator window measuring a minimum 3.52-inch by .60 inch with 1.92 square-inches of front facing viewing area and 180-degree visibility with a total of .236 square-inches of total viewable area.
 - c. Provide snap-in serviceable window to prevent tampering. Lock must function if indicator is compromised.
 - d. Provide messages color-coded with full text and symbol, as scheduled, for easy visibility.
 - e. Unlocked and Unoccupied message will display on white background, and Locked and Occupied message will display on red background.
3. Cylinders: Refer to "KEYING" article, herein.
4. 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.
5. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
6. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
8. Provide electrified options as scheduled in the hardware sets.
9. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
 - a. Lever Design: RHO (Rhodes)

2.09 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin 98/35A series
 - b. Or approved equal
2. Acceptable Manufacturers and Products:
 - a. Detex Advantex series
 - b. Precision APEX 2000 series
 - c. Sargent 19-43-GL-80 series
 - d. Or approved equal

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.

SECTION 08710 - 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.
17. Special Options:
 - a. SI
 - 1) Provide dogging indicators for visible indication of dogging status.

2.10 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage/Von Duprin PS900 Series
 - b. Or approved equal
2. Acceptable Manufacturers and Products:
 - a. Precision ELR series
 - b. Dynalock 5000 series
 - c. Security Door Controls 600 series
 - d. 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.

SECTION 08710 - DOOR HARDWARE

3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
 - 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

A. Manufacturers and Products:

1. Scheduled Manufacturer:
 - a. BEST - Cormax Owners Existing System / Reuse Existing Cores wherever possible
 - b. Or approved equal

B. Requirements:

1. 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.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
 - a. Open: cylinder with small format interchangeable core (SFIC) core with open keyway

2.12 KEYING

A. Scheduled System:

1. Existing non-factory registered system:
 - a. Provide cylinders/cores keyed into Owner's existing keying system managed by Owner's locksmith, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference. Contact:
 - 1) Firm Name: Pittsgrove Township School District
 - 2) Contact Person:
 - 3) Telephone:

B. Requirements:

1. Construction Keying:
 - a. Replaceable Construction Cores.

SECTION 08710 - DOOR HARDWARE

- 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. Permanent Keying:
- a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - 1) Master Keying system as directed by the Owner. Reuse existing Permanent Cores wherever possible.
 - b. 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.
 - c. Provide keys with the following features:
 - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
 - d. Identification:
 - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
 - 2) Identification stamping provisions must be approved by the Architect and Owner.
 - 3) 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.
 - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
 - e. Quantity: Furnish in the following quantities.
 - 1) Permanent Control Keys: 3.
 - 2) Master Keys: 6.
 - 3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
 - 4) Key Blanks: Quantity as determined in the keying meeting.

2.13 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Telkee
 - b. Or approved equal
2. Acceptable Manufacturers:
 - a. HPC
 - b. Lund
 - c. Or approved equal

SECTION 08710 - DOOR HARDWARE

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.14 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 4040XP series
 - b. Or approved equal
2. Acceptable Manufacturers and Products:
 - a. Sargent 281 series
 - b. Corbin-Russwin DC8000 series
 - c. or approved equal

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. 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.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
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. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
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 Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).

SECTION 08710 - DOOR HARDWARE

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.
11. Closers shall be capable of being upgraded by adding modular mechanical or electronic components in the field.

2.15 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
 - b. Or approved equal
2. Acceptable Manufacturers:
 - a. Elmes
 - b. Burns
 - c. Trimco
 - d. 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.

2.16 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
 - b. Or approved equal
2. Acceptable Manufacturers:
 - a. Burns
 - b. Trimco
 - c. 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. Size 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 - DOOR HARDWARE

2.17 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
 - b. Or approved equal
2. Acceptable Manufacturers:
 - a. Burns
 - b. Trimco
 - c. 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
 - b. Or approved equal
2. Acceptable Manufacturers:
 - a. National Guard
 - b. Reese
 - c. 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 - DOOR HARDWARE

2.19 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
 - b. Or approved equal
2. Acceptable Manufacturers:
 - a. Burns
 - b. Trimco
 - c. 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
 - b. Or approved equal
2. Acceptable Manufacturers:
 - a. GE-Interlogix
 - b. Sargent
 - c. 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

SECTION 08710 - DOOR HARDWARE

7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

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. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 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
- 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.

SECTION 08710 - DOOR HARDWARE

- 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. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.
- M. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- N. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- O. 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.
- P. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- Q. 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.
- R. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

SECTION 08710 - DOOR HARDWARE

3.03 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. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 3. 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.

3.04 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.

3.05 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.
- 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.

SECTION 08710 - DOOR HARDWARE

Abbreviation	Name
BES	Best Locking Systems
IVE	H.B. Ives
LCN	LCN Commercial Division
SCE	Schlage Electronic Security
SCH	Schlage Lock Company
TBD	Manufacturer To Be Determined
VON	Von Duprin
ZER	Zero International Inc

120784 OPT0392920 Version 2

Legend:

✓ Electrified Opening

Hardware Group No. F-01

For use on Door #(s):

F01.1

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONTINUOUS HINGE	224HD	628	IVE
2	EA	MANUAL FLUSH BOLT	FB458 12"	626	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	PANIC HARDWARE	98-NL-OP-110MD-1609	626	VON
1	EA	SFIC RIM CYLINDER W/ CONST CORE	80-159 BRN	626	SCH
1	EA	SFIC 7-PIN CORMAX PERMANENT CORE	SFIC 7 PIN	626	BES
2	EA	RECESSED DOOR PULL	PROVIDED BY FRP DOOR MFG.		TBD
2	EA	SPRING CUSH SURFACE CLOSER	4040XP SCUSH	689	LCN
2	EA	CUSH SHOE SUPPORT	4040XP-30 SRT	689	LCN
2	EA	BLADE STOP SPACER	4040XP-61 SRT	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	SET	GASKETING	139A-S	A	ZER
1	EA	HEAD OF DOOR RAIN DRIP	142AA	AA	ZER
2	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A-223	A	ZER

** "IF POSSIBLE" RE-USE EXISTING BEST SFIC 7-PIN PERMENANT CORE / PROVIDE CONSTRUCTION CORE ONLY

** RIM STRIKE FOR INACTIVE DOOR

SECTION 08710 - DOOR HARDWARE

Hardware Group No. F-02

For use on Door #(s):

F01

Provide each SGL door(s) with the following:

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
1	EA	CONTINUOUS HINGE W/ EPT	224HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10 CON	✓ 689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-NL-OP-110MD-CON 24 VDC	✓ 626	VON
1	EA	SFIC RIM CYLINDER W/ CONST CORE	80-159 BRN	626	SCH
1	EA	SFIC 7-PIN CORMAX PERMANENT CORE	SFIC 7 PIN	626	BES
1	EA	RECESSED DOOR PULL	PROVIDED BY FRP DOOR MFG.		TBD
1	EA	SPRING CUSH SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30 SRT	689	LCN
1	EA	BLADE STOP SPACER	4040XP-61 SRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	SET	GASKETING	139A-S	A	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A-223	A	ZER
1	EA	WIRE HARNESS TO POWER SUPPLY	CON-192P		VON
1	EA	LOCK TO HINGE CONNECTOR	CON-32		VON
1	EA	DOOR CONTACT	679-05HM	✓ BLK	SCE
1	EA	POWER SUPPLY	PS904 120/240 VAC	✓	VON
1	EA	WIRING DIAGRAMS, CARD READERS, BY DIV 16	BY SECURITY INTEGRATOR	✓ TBD	TBD

** "IF POSSIBLE" RE-USE EXISTING BEST SFIC 7-PIN PERMENANT CORE / PROVIDE CONSTRUCTION CORE ONLY

SECTION 08710 - DOOR HARDWARE

Hardware Group No. F-02.1

For use on Door #(s):

F02 F03 F04

Provide each SGL door(s) with the following:

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
1	EA	CONTINUOUS HINGE	224HD	628	IVE
1	EA	PANIC HARDWARE	98-NL-OP-110MD	626	VON
1	EA	SFIC RIM CYLINDER W/ CONST CORE	80-159 BRN	626	SCH
1	EA	SFIC 7-PIN CORMAX PERMANENT CORE	SFIC 7 PIN	626	BES
1	EA	RECESSED DOOR PULL	PROVIDED BY FRP DOOR MFG.		TBD
1	EA	SPRING CUSH SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30 SRT	689	LCN
1	EA	BLADE STOP SPACER	4040XP-61 SRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	SET	GASKETING	139A-S	A	ZER
1	EA	HEAD OF DOOR RAIN DRIP	142AA	AA	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A-223	A	ZER

** "IF POSSIBLE" RE-USE EXISTING BEST SFIC 7-PIN PERMENANT CORE / PROVIDE CONSTRUCTION CORE ONLY

Hardware Group No. F-03

For use on Door #(s):

F01A

Provide each SGL door(s) with the following:

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	STD WEIGHT HINGE	5BB1 4.5 X 4.5	626	IVE
1	EA	PRIVACY LOCK W/ OUTSIDE INDICATOR	ND40S RHO OS-OCC	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	626	IVE
1	EA	SGL COAT HOOK	507B	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

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

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 2021, NJ Edition.
 - 2) Design wind load velocity at the project site is 125 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 2018 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. NGA/GANA Publications: "Glazing Manual" and "Laminated Glazing Reference Manual."
 - 2. FGIA/IGMA Publication for Insulating Glass: IGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- 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, Laminated Glass and Insulating Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass

SECTION 08800 – GLAZING

manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS

- A. Tinted Float Glass: ASTM C1036, Type I, Class 2 (tinted), Quality-Q3.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Guardian Glass, LLC; See Schedule or select comparable product by one of the following:
 - a. Vitro.
 - b. Interpane.
 - c. Or approved equal.
- B. Fully Tempered Float Glass; ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion horizontally oriented upon completion of installation, unless otherwise indicated.
- C. Low-E Coated Vision Glass: ASTM C 1376, coated by vacuum deposition (sputter-coating) process, and complying with other requirements specified.
- D. Laminated Glass: comply with ASTM C 1172. Provide products classified by the Glass Industry for use in "Safety Glazing Applications". Laminated Glass shall comply with the Consumer Product Safety Commission 16 CFR 1201 and the Safety Glass requirements of ANSI Z97.1 (current editions). 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.
- E. 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.
 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.

SECTION 08800 – GLAZING

5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
 - a. Spacer Material: Stainless Steel warm edge spacer OR 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.
- 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:

SECTION 08800 – GLAZING

- 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).
- 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.

SECTION 08800 – GLAZING

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 INSULATING GLASS UNITS

- A. Low-E Coated, Tinted Insulating **Vision** Glass Unit IG-1 Gray/Light Gray (Standard 1" Unit):
 - 1. Overall Unit Thickness: 1 inch.
 - 2. Outdoor Lite: 1/4 inch (6 mm), Class 2 (tinted), float glass.
 - a. Tint Color: Owner to select from manufacturer's standard light gray, gray and/or blue tint colors.
 - b. Low-E Coating on #3 Surface: VITRO SB 60 or approved equal.
 - c. Heat Treatment: Kind FT (fully tempered).
 - 3. Interspace: Argon filled, 1/2 inch wide, hermetically sealed.
 - 4. Indoor Lite: 1/4 inch (6 mm), Class 1 (clear), float glass.
 - a. Heat Treatment: Kind FT (fully tempered).
 - 5. Glass Unit Performance Values for **Light Gray (CrystalGray) Glass**:
 - a. Visible Light Transmittance: 48 percent minimum.
 - b. Winter Nighttime U-Factor: 0.25 maximum.
 - c. Summer Daytime U-Factor: 0.22 maximum.
 - d. Solar Heat Gain Coefficient: 0.29.
 - 6. Glass Unit Performance Values for **Gray Glass**:
 - a. Visible Light Transmittance: 34 percent minimum.
 - b. Winter Nighttime U-Factor: 0.25 maximum.
 - c. Summer Daytime U-Factor: 0.22 maximum.
 - d. Solar Heat Gain Coefficient: 0.24.

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.

SECTION 08800 – GLAZING

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.
 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.

SECTION 08800 – GLAZING

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.
- C. Design framing systems in accordance with 2021 IBC New Jersey Edition and AISI S220.

1.2 SUBMITTALS

- A. Evaluation Reports: Submit evaluation reports certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 accreditation criteria for inspection agencies.
- B. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified in accordance with the product-certification program of the Steel Framing Industry Association (SFIA) or similar organization providing a verifiable code-compliance program.
- C. Provide an index (table of contents) of job specific products, assemblies and reference the contract drawing details. Indicate on the manufacturer's cut sheets the specific products, gauge, etc. to be used (be specific).

1.3 PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - 1. Steel Framing and Furring:
 - a. ClarkDietrich
 - b. Marino/Ware (formerly Marino Industries Corp.).
 - c. Or approved equal.
 - 2. Grid Suspension Assemblies:
 - a. Armstrong World Industries, Inc.
 - b. USG Interiors, Inc.
 - c. 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.

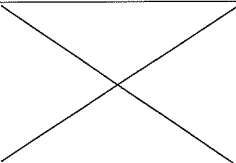
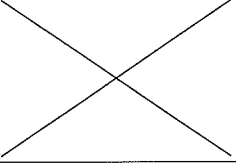
SECTION 09255 – GYPSUM BOARD ASSEMBLIES

- 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.
 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 coating.
 5. Flat Hangers: Mild steel and zinc coated or protected with rust-inhibitive coating.
 6. Channels: Cold-rolled steel, 16 ga minimum thickness of base steel and 1/2-inch (13-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: AISI S220, in depth indicated and with 0.0179 inch (0.45 mm) minimum base steel thickness, unless otherwise indicated.
1. Protective Coating: Comply with AISI S220; ASTM A 653, G 40 (Z120); or coating with equivalent corrosion resistance of ASTM A653/A653M, G40 (Z120) hot-dip galvanized coating for framing for exterior soffits and ceiling suspension members in areas within 10 feet (3 m) of exterior walls. Galvannealed products are unacceptable.
 - a. Coating to demonstrate equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.
- D. Steel Resilient Furring Channels: Standard product fabricated from steel sheet complying with ASTM A 653 (ASTM A 653M) 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).
 2. Single-Leg Configuration: Asymmetrical.
 - a. Product: ClarkDietrich; RC Deluxe (RCSD) Resilient Channel or approved equal.
- 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)

SECTION 09255 – GYPSUM BOARD ASSEMBLIES

1. Protective Coating: Comply with AISI S220; ASTM A 653, G 40 (Z120) or coating with equivalent corrosion resistance of ASTM A653/A653M, G40 (Z120), hot-dip galvanized coating for framing members attached to and within 10 feet (3 m) of exterior walls. Galvannealed products are unacceptable.
 - a. Coating to demonstrate equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.
2. Steel Studs and Runners: AISI S220 in depth indicated 20 gauge minimum base steel thickness, unless otherwise indicated.
 - a. Product: ClarkDietrich; ProSTUD Drywall Framing System ProSTUD 30 (0.0296 inch – 0.7518 mm) for typical walls and ProSTUD 33 (0.0329 inch – 0.8382 mm) for tile walls with Smart Edge technology and with DiamondPlus® Coating or approved equal.

**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.
	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"	
SEE STRUCTURAL DRAWINGS FOR OTHER FRAMING GAUGE & SIZE			

- G. Steel Rigid Furring Channels: AISI S220, hat shaped, in depth indicated and with 0.0296 inch (20 gauge), minimum base steel thickness unless otherwise indicated.
 1. Product: ClarkDietrich; Furring Channel or approved equal.
- 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.

SECTION 09255 – GYPSUM BOARD ASSEMBLIES

- 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. Abuse Resistant Gypsum Board: Hi-Abuse Brand Wallboard, fire resistant gypsum core encased in a heavy, smooth, white abrasion resistant paper on the face side and heavy liner paper on the back side, 5/8" thick. Conforming to the physical properties of ASTM C36 and ASTM C1177 on Glass mat back. Rating of 10 "No Mold Growth" as tested for 4 weeks according to ASTM D3273 "Armor Plus" manufactured by Georgia-Pacific Corporation or approved equal.
 - 2. Moisture Rated Gypsum Board: (Interior Moisture, Mold and Mildew Resistant Gypsum Wallboard): Coated inorganic glass mat-faced, water resistant treated gypsum core wallboard, 5/8" thick. Conforming to the physical properties of ASTM 630 and ASTM C1177, Rating of 10 "No Mold Growth" as tested for 4 weeks according to ASTM D3273. DensArmor Plus Interior Guard manufactured by Georgia-Pacific Corporation or approved equal.
 - 3. Tile Backer: (Water Resistant Board):
 - a. DensShield Tile Backer (or approved equal) sheathing conforming to ASTM C 1178/C, mold resistant; 5/8" thick, non-combustible; perm rating <1.5.
 - b. Cementitious Backer Units: ANSI A 118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges. Product subject to compliance with requirements of USG Corporation; DUROCK cement board, 5/8" thick; mold resistance ASTM D 3273, score of 10, or approved equal.
 - 4. Exterior Sheathing: DensGlass Gold Exterior (or approved equal) sheathing conforming to ASTM C1177, water-resistant, treated core with a fiberglass mat face and back, 5/8" thick, non-combustible; resistant to growth of mold per ASTM D3273.
- J. Gypsum Board Base Layer(s) for Multilayer Applications: ASTM C 1396 in thickness indicated:
 - 1. Type: 5/8 inches Type X where 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.

SECTION 09255 – GYPSUM BOARD ASSEMBLIES

- 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.
 - 1) Product: ClarkDietrich; Strait-Flex Butt-Tape, or approved equal.
- 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 E90.
- 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.

SECTION 09255 – GYPSUM BOARD ASSEMBLIES

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.

1.4 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. 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. All interior walls are STC-rated and some are 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.

SECTION 09255 – GYPSUM BOARD ASSEMBLIES

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.
- 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 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, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels. Provide per manufacturer's recommendations / industry standards.
 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. All walls are STC-rated gypsum board assemblies. 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 board within 6 feet of wet locations. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or penetrations.
 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.

SECTION 09255 – GYPSUM BOARD ASSEMBLIES

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. For all areas provide Level 4 finish for gypsum board surfaces.
 4. 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.
 5. Finish water-resistant gypsum backing board to comply with ASTM C 840 and gypsum board manufacturer's directions.

END OF SECTION 09255

SECTION 09510 - ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 Summary:

- A. This Section includes acoustical ceilings consisting of suspended exposed-grid systems with lay-in acoustical panels.

1.2 Submittals:

- A. Product Data: Manufacturer's complete technical descriptive literature for each item required, including specifications and installation recommendations.
- B. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Within 60 days after award of Contract, submit coordination drawings for all new or altered areas, drawn accurately to a scale no less than 1/8" = 1' - 0", coordinating penetrations and ceiling-mounted items. Coordinate with other prime contractors to obtain necessary information and agreement on location of penetrations and ceiling-mounted items. Upon review and acceptance by Architect, incorporate revisions (if any) into an AutoCAD -based file. Furnish one hard copy of accepted shop drawings and one updated CAD-file copy to all other applicable prime contractors for their further information and use. Show the following:
 - 1. Ceiling suspension system members.
 - 2. Method of attaching hangers to building structure.
 - 3. Bulkheads, soffits, areas with drywall ceilings (if any), and areas of exposed structure (if any).
 - 4. Room names and numbers, ceiling types, and ceiling elevations above the finished floor.
 - 5. Special moldings at walls, column penetrations, and other junctures with adjoining construction, including all curved walls and bulkheads.
 - 6. Ceiling-mounted items, including light fixtures; HVAC air distribution devices; speakers; fire alarms; sprinkler heads; and other similar devices or fixtures.
- C. Shop Drawings: Show details and information pertinent to construction, installation, and placement of all components required for continuous, smooth wall angles at curved walls, bulkheads and circular columns. Include sections of typical curved wall angle.

1.3 Quality Assurance:

- A. Installer Qualifications: Engage an experienced installer who has completed acoustical tile ceilings and finishes similar in material, design, and extent to that indicated for this Project and with a minimum five-year record of successful in-service performance.
- B. Source Limitations for Ceiling Units: Obtain all acoustical panel and grid systems from one single source.

1.4 Delivery, Storage and Handling:

- A. Deliver acoustical materials and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be

SECTION 09510 - ACOUSTICAL CEILINGS

protected against damage from moisture, direct sunlight, surface contamination, and other detrimental conditions.

- B. Before installing acoustical materials, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical tiles and panels carefully to avoid chipping edges or damaging units in any way.

1.5 Project Conditions:

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. The work area shall be broom clean and the structure in proper condition to receive acoustical materials. Acoustical work shall follow the installation of ductwork, piping and conduit located in ceiling space above ceilings.

1.6 Coordination:

- A. Coordinate layout and installation of acoustical materials and suspension systems with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 PRODUCTS

2.1 Acoustical Ceilings. General:

- A. Humidity Resistance: Unless indicated otherwise, ceiling panels shall be rated for 90% humidity conditions and shall have a 10-year sag- and warp-resistance warranty, comparable to Armstrong's "HumiGuard Plus" or approved equal.
- B. Acoustical Ceiling Colors: Manufacturer's standard white, unless indicated otherwise.
- C. Fire-Test-Response Characteristics: Provide ceilings (ceiling panels/tiles, grids and accessories) that comply with the following requirements:
 - 1. Fire-response tests were performed by UU, ITS/Wamock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
 - 2. Surface-burning characteristics of acoustical panels shall comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.
- D. Dimensions: Length by width dimensions for lay-in ceiling panels are nominal dimensions. Actual dimensions are to be factory-cut sizes that fit within suspended

SECTION 09510 - ACOUSTICAL CEILINGS

ceiling grids having standard modular dimensions matching the specified panel nominal length and width.

2.2 Acoustical Ceiling Systems:

- A. ACT-A: 24 in. x 48 in. x 7/8 in. lay-in panels with square edge profile; wet-formed panel composed of mineral fiber with a factory-applied, vinyl latex paint finish; minimum light reflectance (LR) rating of 0.84; minimum ceiling attenuation class (CAC) of 40; and minimum noise reduction coefficient (NRC) of 0.70. Suspension system - Type A.

1. Subject to compliance with requirements, provide one of the following panel products:
 - a. Armstrong World Industries; School Zone Fine Fissured #1714
 - b. Certainteed; Sereno Fine Fissured #SFF-497 HNRC/HCAC
 - c. USG Interiors; Radar Clima Plus, High-NRC #2410
 - d. or approved equal

2.3 Suspension Systems:

- A. General: Unless indicated otherwise, suspension grids shall comply with ASTM C 635 "Intermediate Duty" Classification.
- B. Suspension System Types:
1. Type A: Exposed grid system with 15/16 in. wide face, shall be HDG steel, Class A Fire Rated, White.
- C. Suspension System Accessories: Provide all accessories necessary to complete installation, including, but not limited to, the following:
1. Preformed, factory-finished, bull-nosed comers to match grid material and finish. Provide comers where grid meets bull-nosed block.
 2. Provide impact clips at toilet room and gymnasium ceilings.
 3. Provide retention clips for ceilings located in wind locks and vestibules.
 4. Provide white, dual durometer polyvinylchloride (PVC) bellows-style filler for 1-inch expansion joints in suspended lay-in acoustical ceilings, selected from the following options:
 - a. Allway HC/HC W Series; Construction Specialties, Inc.
 - b. DX Series; M M Systems Corp.
 - c. Wabo Fast Wrap CES Series; Watson Bowman Acme Corp.
 - d. or approved equal

PART 3 EXECUTION

3.1 Ceiling Installation:

- A. Suspend main beams spaced at 24 in. or 48 in. o.c., as indicated on Drawings, from structure above by minimum #12 gauge galvanized wire hangers spaced not more than 48 in. o.c.

SECTION 09510 - ACOUSTICAL CEILINGS

- B. Install interlocking cross-tees at 24 in. o.c. to form a 24 in. x 48 in., or 24 in. x 24 in. grid pattern.
- C. System shall be accurately leveled to within 1/8 in. in 12 ft. 0 in. Deflection shall not exceed 1/360 of the span of any component.
- D. Provide matching perimeter molding around separate room areas, abutting walls, and around columns and similar protrusions, unless indicated otherwise.
 - 1. At radiused bulkheads and walls, provide curved wall angle, factory-formed to match diameter of bulkheads and walls; aluminum, finished to match ceiling grid. Field cut and formed edges made up of straight sections will not be permitted.
- E. Where perimeter molding meets expansion joint trim, provide a clear break in the molding equal to no less than the expansion joint width.
- F. Scribe and cut panels at borders and penetrations to provide a neat, precise fit. Coordinate with work of HVAC, plumbing and electrical trades.

3.2 Cleaning:

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 GENERAL

- A. Submittals: As follows:
 - 1. Product Data: For each type of product specified.
 - 2. Samples: In manufacturer's standard sizes of each product color and pattern specified.
- B. Extra Materials: Furnish not less than 10 linear feet (3 linear m) for each 500 linear feet (150 linear m) or fraction thereof, of each different type, color, pattern, and size of resilient product installed. Deliver extra materials to Owner.
- C. Stair treads shall comply with ADA Code for visual impaired strip in contrasting color with a factory manufactured integral color product. Field applied strips are not acceptable.

PART 2 PRODUCTS

- A. Manufacturers
 - 1. Basis-of-Design: Johnsonite (Tarkett) Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.
 - 2. Roppe
 - 3. or approved equal
- B. Rubber Cove Wall Base: Basis of design is Johnsonite Wall Base Duracove Thermoplastic Rubber or approved equal, Standard Toe, 4" high x 1/8" thick. Coiled lengths. Color shall be selected from the manufacturer's standard choices. Use the manufacturer's standard adhesives.
- C. Vented Cove Base: Basis of design is Tarkett Vent Cove Wall Base. Products complying with ASTM F-1861, Type II, Style B-Coved, 4" high with a 3" toe by 1/8" thick. Color shall be selected from manufacturer's standard choices. Use the manufacturer's standard adhesives.
- D. Rubber Stair Treads: Basis of design is Johnsonite Angle Fit Rubber Stair Tread with visual impaired strip in contrasting color. Hammered texture. Color shall be selected from the manufacturer's standard choices. Use the manufacturer's standard adhesives. Comply with IBC 2021 NJ Edition and ADA = ICC A117.1.
- E. Rubber Landing Tile: Basis of design is Johnsonite solid color Rubber Tile. Thickness to be 1/8", tile size to be 24"x24" with hammered texture. Color shall be selected from the manufacturer's standard choices and should match the color of Stair Treads. Use the manufacturer's standard adhesives.
- F. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by resilient product manufacturer for applications indicated.

SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

- G. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PAT 3 EXECUTION

- A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements, including those for maximum moisture content. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Preparation: Comply with manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.
- C. Installation: Install resilient products according to manufacturer's written installation instructions.
 - 1. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
 - a. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
 - b. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
 - c. Do not stretch base during installation.
 - d. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
 - e. Form corners on job, from straight pieces of maximum lengths possible, without whitening at bends.
 - 2. Place resilient products so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.
 - 3. Apply resilient products to stairs as indicated.
- D. Clean and protect resilient products according to manufacturer's written recommendations. Clean resilient products after installation and not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project.

END OF SECTION 09653

SPECIFICATION 09670 - FLUID APPLIED FLOORING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Provide labor and materials for a seamless, polymer epoxy floor coating system, including surface preparation, primers and finish coats.

1.2 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. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals.

- A. Industrial Floor Corporation
- B. DUR-A-FLEX INC.
- C. General Polymers
- D. Selby
- E. Stonehard
- F. Manufacturer approved installer, who has technical qualifications, currently approved in writing and facilities to install specified systems.

1.3 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.

1.4 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

1.5 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 & 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.

1.6 WARRANTY

- A. Submit a two (2) year warranty against defects in material and workmanship upon Substantial Completion of installation.

PART 2 - PRODUCTS

2.1 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.
- C. Colors to be selected by Owner from manufacturer's full range of color options.

2.2 PHYSICAL PROPERTIES

Property	Test Method	Result
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 ⁵
Linear Shrinkage	ASTM D-2566	0.02%
Linear Expansion	ASTM D-696	2 x 10 ⁻⁵
Bond Strength to Concrete	ASTM D-4541	400 psi substrate fails
Indentation	ML D-3134	.025 MAX
Impact Resistance	ML D-3134	Pass

SPECIFICATION 09670 - FLUID APPLIED FLOORING

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

Property	Test Method	Result
Coefficient of Friction	ASTM D-2047	
Standard Slip-Resistant	N/A	
Orange Peel		0.8
Smooth		0.7
VOC Content	Epoxy Resin Glaze	0g/l
	Polyurethane 2 HS	320.8 g/l

2.3 EPOXY PRODUCT MIXING

- A. Mix on site with manufacturer supplied mix and measure apparatus to ensure a timely, accurate mix ratio and minimize waste.

2.4 CONCRETE SUBSTRATE MOISTURE BARRIER

- A. Prepare the existing concrete floor slab to receive new epoxy flooring system per the manufacturer's recommendations. Following slab preparation prime concrete slab and provide self-leveling underlayment, provide a moisture control system coating throughout the existing floor slab area to create a continuous moisture barrier between the floor slab and new floor finish. Suitable for use up to 100% relative humidity in the floor slab. Acceptable moisture control products are as follows:

- a. Ardex MC Rapid.
- b. Or Approved Equal

2.5 SELF LEVELING UNDERLAYMENT

- A. Hydraulic Cement-Based Self-Leveling Underlayment

- a. ARDEX K 15[®]; Manufactured by ARDEX AMERICAS, USA, or approved equal.
 - i. Primer:
 - 1. Standard Absorbent Concrete: ARDEX P 51[™] Primer or approved equal.
 - 2. Extremely Absorbent Concrete: May require two applications of ARDEX P 51[™] to minimize the potential for pinholes forming in the ARDEX K 15 or approved equal.
 - 3. Wood: ARDEX P 82[™] Ultra Prime or approved equal.
 - 4. Metal: ARDEX EP 2000[™] Substrate Preparation Epoxy Primer or approved equal.

SPECIFICATION 09670 - FLUID APPLIED FLOORING

5. Other Non-Porous Substrates (burnished concrete, terrazzo, well-bonded ceramic, quarry and porcelain tiles, epoxy coating systems and non-water soluble adhesive residue on concrete and concrete treated with silicate compounds): ARDEX P 82™ Ultra Prime or approved equal.
- ii. Performance and Physical Properties: Meet or exceed the following values for material cured at 73° F+/-3°F (23° C+/-3°C) and 50% +/-5% relative humidity:
 1. Application: Barrel Mix or Pump
 2. Flow Time: 10 minutes
 3. Walkable: 2 to 3 hours
 4. Compressive Strength: 5,500 psi (385 kg/cm²) at 28 days, ASTM C109M
 5. Flexural Strength: 1,200 psi (84 kg/cm²) at 28 days, ASTM C348
 6. VOC: 0

PART 3 - EXECUTION

3.1 PREPARATION

- A. **Wood Substrate** - At existing wood plank flooring, repair and fill all voids in existing plank hardwood flooring to a smooth, level finish. Provide new ¼" 5 PLY hardwood plywood underlayment throughout area to receive new fluid applied floor finish system. Install new ¼" plywood underlayment with fully continuous adhesive and mechanical fasteners @ 12" O.C. Create a surface profile by sanding the plywood with 60 grit paper or screens. After preparation of the new plywood underlayment is complete, provide fiberglass mesh tape at all underlayment board joints per the manufacturer's recommendations.
- B. **Concrete Substrate** - 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 moisture barrier and Epoxy quartz flooring systems. Create a surface profile with a steel shot blast machine and dust-free diamond grinders for edges.
- C. **Epoxy Finish Substrate** – At all areas where new epoxy floor finish is to be installed overtop existing epoxy floor system, remove all loose or delaminated material in its entirety. Sand and clean the existing epoxy floor finish to roughen and de-gloss the entire surface. Remove all dust and debris.
- D. Verify that the surface is dry and perfectly clean, free of all oil, grease, detergent, film, sealers and/or curing compounds.
- E. Verify acceptable condition of the substrate with the manufacturer prior to new floor finish installation.

SPECIFICATION 09670 - FLUID APPLIED FLOORING

3.2 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 1/8"-3/16".

3.3 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. AKey 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 all exposed surfaces. Block fill prime paint all CMU walls full height to the roof deck above ceiling and behind all built in casework, lockers, etc. Paint ALL CMU walls with block filler including but not limited to behind metal stud furred out finished wall. 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. If the schedules do not indicate color or finish, the Owner will select from standard colors and finishes available.
- C. Do not paint prefinished items, 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) samples of natural- or stained-wood finish on actual wood surfaces.
 - d. Ferrous Metal: Provide two 4-inch- (100-mm-) square samples of flat

SECTION 09900 – PAINTING

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.

SECTION 09900 – PAINTING

3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been 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

SECTION 09900 – PAINTING

- cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand 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.

SECTION 09900 – PAINTING

- 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.
- 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), The Pittsburgh Paints Company (PITT) or approved equal products:
- S. **Exterior Paint Systems:**
 - 1. Ferrous Metal:
 - a. Full gloss enamel finish - rust inhibitive primer with acrylic finish
 - Primer: SW: Pro Industrial Pro-Cryl Universal Primer
PITT: Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer 90-1912 Series.
 - 1st Coat: SW: Pro Industrial DTM Acrylic Finish, semi-gloss
PITT: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
 - 2nd Coat: SW: Pro Industrial DTM Acrylic Finish, semi-gloss
PITT: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
 - 2. Non-Ferrous Metal and AESS Steel Finish:
 - a. Full gloss enamel finish - galvanized metal primer with acrylic finish (Lintels, Railings, Bollards, columns, canopy frames, etc.)
 - Primer: SW: Pro Industrial Pro-Cryl Universal Primer
PITT: Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer 90-1912 Series.
 - 1st Coat: SW: Pro Industrial DTM Acrylic Finish, semi-gloss
PITT: Pitt-Tech Plus EP Interior/Exterior DTM Industrial Enamel Semi-Gloss. 90-1610 Series
 - 2nd Coat: SW: Pro Industrial DTM Acrylic Finish, semi-gloss
PITT: Pitt-Tech Plus EP Interior/Exterior DTM Industrial Enamel Semi-Gloss. 90-1610 Series
 - b. AESS Steel finish shall be level 4 and finish painted in a controlled environment shop offsite.

SECTION 09900 – PAINTING

T. Interior Paint Systems:

1. Concrete, Masonry (not including CMU):
 - a. Acrylic epoxy
 - Primer: SW: Loxon Concrete & Masonry Primer
PITT: Paints Speedhide zero Interior Latex Primer 6-4900XI
 - 2nd Coat: SW: Pro Industrial Pre-Catalyzed Epoxy
PITT: Paints Pitt Glaze W B1 Pre-Catalyzed Epoxy 16-xxx
 - 3rd Coat: SW: Pro Industrial Pre-Catalyzed Epoxy
PITT: 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 Acrylic Block Surfacer
PITT: Paints Speedhide Latex Block Filler 6-15XI
 - 2nd coat: SW: ProIndustrial Pre-Catalyzed Epoxy, eggshell
PITT: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-1310
 - 3rd Coat: SW: ProIndustrial Pre-Catalyzed Epoxy, eggshell
PITT: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-1310
 - b. Acrylic epoxy – semi-gloss finish (Kitchen areas)
 - Filler: SW: Loxon Acrylic Block Surfacer
PITT: Paints Speedhide Latex Block Filler 6-15XI
 - 2nd coat: SW: Pro Industrial Pre-Catalyzed Epoxy, semi-gloss
PITT: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-1510
 - 3rd Coat: SW: Pro Industrial Pre-Catalyzed Epoxy, semi-gloss
PITT: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-1510
3. Drywall and Plaster:
 - a. Acrylic latex
 - Primer: SW: ProMar 200 Zero VOC Interior Latex Primer
PITT: Paints Speedhide zero Interior Latex Primer 6-4900XI
 - 2nd Coat: SW: Pro Industrial Pre-Catalyzed Waterbased Epoxy
PITT: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx
 - 3rd Coat: SW: Pro Industrial Pre-Catalyzed Waterbased Epoxy
PITT: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx
4. Wood:
 - a. Acrylic epoxy
 - Primer: SW: Multi-Purpose Interior/Exterior Latex Primer Sealer
PITT: Paints Seal Grip Interior/Exterior Primer/Sealer 17-921XI
 - 2nd Coat: SW: ProIndustrial Pre-Catalyzed Epoxy
PITT: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx
 - 3rd Coat: SW: ProIndustrial Pre-Catalyzed Epoxy
PITT: Paints Pitt Glaze WB1 Pre-Catalyzed Epoxy 16-xxx

SECTION 09900 – PAINTING

- b. Transparent Stain with urethane finish
 - 1st coat: SW: Minwax Wood Finish 250 Stain
PITT: Varithane Classic Water Based Wood Stain VAR-89 Series
 - 2nd Coat: SW: Minwax Polycrylic
PITT: ProLuxe Specialty Interior/Exterior Gloss Waterbased Poly Clear.
 - 3rd Coat: SW: Minwax Polycrylic
PITT: ProLuxe Specialty Interior/Exterior Gloss Waterbased Poly Clear.
- 5. Ferrous Metal:
 - a. Gloss Finish - rust inhibitive primer with acrylic finish
 - Primer: SW: Pro Industrial Pro-Cryl Universal Primer
PITT: Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer 90-1912 Series.
 - 1st Coat: SW: Pro Industrial DTM Acrylic Finish, semi-gloss
PITT: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
 - 2nd Coat: SW: Pro Industrial DTM Acrylic Finish, semi-gloss
PITT: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
- 6. Non-Ferrous Metal (New Galvanized and Aluminum):
 - Primer: SW: ProIndustrial Pro-Cryl Primer
PITT: Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer 90-1912 Series.
 - 1st Coat: SW: Pro Industrial DTM Acrylic Finish, semi-gloss
PITT: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
 - 2nd Coat: SW: Pro Industrial DTM Acrylic Finish, semi-gloss
PITT: Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
- 7. Concrete Floors – light traffic (janitor closets and utility spaces)
 - Primer: SW: ArmorSeal Tread-Plex Water Based Acrylic Primer
PITT: Breakthrough Satin Acrylic V51 Series
 - 2nd coat: SW: ArmorSeal Tread Plex Water Based Acrylic Finish
PITT: Breakthrough Satin Acrylic V51 Series
- 8. Concrete Floors – High Traffic Epoxy
 - Primer: SW: ArmorSeal 8100 Urethane Epoxy @ 3.0-5.0 mils dft
PITT: Aquapon WB EP Waterborne Epoxy Series 98E @ 2.0 mils dft
 - 2nd coat: SW: ArmorSeal 8100 Urethane Epoxy @ 3.0-5.0 mils dft
PITT: Aquapon WB EP Waterborne Epoxy Series 98E @ 2.0 mils dft

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 or approved equal 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 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.**

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: Builder Series RE (formerly known as Hylex RE) ADA compliant signage or approved equal
 - 1. Standard Room Sign: Wall Sign 7" x 7" Glossy/Non-Glare lens with standard ADA tactile and Braille and digitally printed 10 mil double-sided matte rigid PVC film insert
 - a) Sign Face: Constructed of Ultramatte Acrylic which is capable of meeting all ASTM specifications as to physical, optical, mechanical, thermal, electrical and flammability properties. Sign face is 1/16" or 1/8" thick with a matte finish. Available in 25 standard colors and an unlimited choice of custom colors.
 - b) Construction: An Acrylic plate is cut to the required size. A sheet of 1/32" Applique, coated with a factory applied 3M adhesive, is put onto the front of the sign face. All text, numerals and symbols are then

SECTION 10426 – INTERIOR ROOM SIGNS

- computer engraved out of Applique material. The computer then drills .03” holes into the sign face, and optically correct acrylic raster balls are fused .015” into the sign face.
 - c) Tactile Letters and Numerals: Tactile letters and numbers are minimum of 5/8” high, a maximum of 2” high, and are raised a minimum of 1/32” from the sign surface.
 - d) Braille: Grade 2 Braille is to be clear, with no interruption of the smooth, clean surface of the sign.
 - e) Pictogram: Where desired, pictograms are to be placed within an area which is 6” in height in which no other information will be displayed.
- 2. Standard Room Sign (Bathrooms, Elevators, Area of Refuge and Room Occupancy) 8" x 8" Glossy/Non-Glare lens with standard ADA tactile and Braille and digitally printed 10 mil double-sided matte rigid PVC film insert
- 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 2021 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

SECTION 10426 – INTERIOR ROOM SIGNS

- surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
- 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 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.
 - 4. Provide certified inspection tags per local code requirements for all fire extinguishers provided.
- 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. Paper Towel Dispenser
 - 2. Stainless steel framed mirror unit.
 - 3. Toilet tissue dispenser.
 - 4. Soap Dispenser.
 - 5. Grab Bar.
 - 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. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals. 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. Surface Mounted Paper Towel Dispenser: Supplied by Owner and installed by G.C. (assume Model B-2621 of Bobrick Washroom Equipment, Inc., or approved equal for installation pricing).
- D. Double-Roll Toilet Tissue Dispenser: Supplied by Owner and installed by G.C. (assume Georgia Pacific #59209 or approved equal for installation pricing).
- E. Waste Receptacle: Supplied by Owner and installed by G.C. (assume 22 gallons with funnel top. Rubbermaid #3546 and #3548 top or approved equal for installation pricing).
- F. Wastebasket Container: Supplied by Owner and installed by G.C. (assume 28 ½ quarts, Rubbermaid #2956 and #3066 or approved equal for installation pricing).
- G. Surface-Mounted Soap Dispenser: Supplied by Owner and installed by G.C. (assume Kimberly/Clark Model 92144 or approved equal for installation pricing).
- H. Surface-Mounted Napkin/Tampon Vendor: Supplied by Owner and installed by G.C. (assume American Specialties, Inc. #0864 or approved equal for installation pricing). Stainless steel all weld construction. 22 GA cabinet, 18 GA door, coin operation.
- I. Surface-Mounted Sanitary Napkin Disposal: Supplied by Owner and installed by G.C. (assume Bobrick B-254 or approved equal for installation pricing). Stainless steel construction..
- 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

SECTION 10800 - TOILET AND BATH ACCESSORIES

identification by means of either a waterproof, printed label or a stamped nameplate, indicating manufacturer's name and product model number.

- 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 12242 - 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. Roller Shades: Solar type shades that roll into a coil and unroll flat.
 - 2. Provide one (1) shade for every individual window sash at all new windows.

1.3 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: Provide an overall floor plan showing all window shade locations. Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations. Provide a roller-shade schedule on the shop drawing.
- C. Provide Material Samples for Initial Selection: For each type and color of shadeband material.
 - 1. Include samples of accessories involving color selection.
- D. Provide a Typical Window Opening Full Size Mock-up Sample 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.
 - 4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing. In the Shop Drawing, the contractor shall specifically note each deviation or change.
 - 5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Submit a sample Warranty: Provide the manufacturer's warranty documentation.

SECTION 12242 - ROLLER WINDOW SHADES

- F. Provide an Installer Qualifications and a letter from the manufacturer certifying the installer.
- G. Provide Product Certificates that the product meets the “children’s product” US Consumer Product Safety Commission accepted third-party conformity assessment body. The operating cords must be inaccessible or non-hazardous.
- H. Provide Product Test Reports:
 - 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.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roller shades to include in maintenance manuals.

1.5 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.

1.6 WARRANTY

- A. Roller Shade Hardware and Shadecloth: Manufacturer’s 25-year warranty that all components are free from manufacturing defects from the date of substantial completion.
- B. Roller Shade Installation (Labor and Material): Two (2) years from date of substantial completion.

1.7 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.

1.8 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 12242 - ROLLER WINDOW SHADES

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Legrand Clutch Shade System or approved equal.
 - 1. Supplier: Contexture or approved equal
- B. Source Limitations: All shade systems specified in this section shall be provided by one manufacturer.
- C. Basis of Design: TELESHADE system shall be a smooth operating chain and sprocket roller shade system manufactured by Legrand or approved equal. Approved equal substitutions will be considered in accordance with Specification Section 01300-Submittals. Shade shall come pre-assembled to jobsite but allow for reversible chain operation for easy reconfiguration without disassembling the shade system
 - 1. Easy-Lift (Chain operated) Action with infinite positioning. Left hand, right hand or both sides operation available as standard. Provide the chain restraining device.
 - 2. Manual Teleshade shall include a "manual override" requirement that allows the shade to be pulled down by the hembar without using the chain. This operation must be demonstrated onsite with the required sample shade.
 - 3. Provide fully factory assembled shade unit consisting of 2 end brackets, shade tube, extruded aluminum fascia, hembar and fabric.
 - 4. Removal shall not require the disassembly of the shade unit.
 - 5. End Bracket: 3 inches by 3-3/4 inches (77 X 96 mm) end bracket shall be a two piece molded ABS construction with 2-1/2 inches (64 mm) diameter nylon drive sprocket. Brackets color shall co-ordinate with the fascia color.
 - 6. Shade Tube: Extruded aluminum shade tube shall be 1/16 inch (1.52 mm) thick with three internal continuous fins 3/16 inch (4.82 mm) high, for strength and drive capabilities when attached to the nylon sprocket. The fins shall be spaced 120 degrees apart.
 - 7. Fascia: the extruded aluminum fascia shall be 1/16 inch (1.7 mm) thick, complete with two continuous screw flutes, anodized or powder coated as required
 - 8. Drive Assembly: - Factory set for size and travel of shades.
 - a. Capable of being field adjusted from the exterior of the shade unit without having to disassemble the hardware.
 - b. Provided with a built-in shock absorber system to prevent chain breakage, under normal usage conditions.
 - 9. Drive Chain: shall be No. 10 stainless steel bead chain formed in a continuous loop. Chain with 90 pound tensile strength.
 - 10. Exterior Hem-bar: extruded aluminum with plastic end finials.
 - 11. Fabric –Room Darkening Fabric – 0% - Color to be selected from manufacturers standard. Fabric must be NFPA 701 compliant.
 - 12. Front Fascia: Provided by shade contractor.
 - a. SnapLoc (or approved equal) 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.

SECTION 12242 - ROLLER WINDOW SHADES

13. End Caps: To cover exposed end caps.

2.2 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 greatest extent possible except as follows:
 1. Railroaded Materials: Railroaded materials due to material roll width not meeting window opening requirements will not be permitted.

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.

SECTION 12242 - ROLLER WINDOW SHADES

- 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 12242

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Engineered wood-framed structures consisting of the following components:
 - a. Factory-engineered wall columns.
 - b. Factory-engineered roof truss.
 - c. Factory-engineered metal roof and wall panels.
 - d. Factory-engineered building system accessories.
 - e. Prefinished metal trim items.
 - f. Prefinished ridge vents and soffits.

1.2 REFERENCES

- A. Reference Standards:
 - 1. Preservative Treated Lumber:
 - a. American Wood Preservers Association (AWPA).
 - 2. Lumber grading rules and wood species:
 - a. National Design Specifications for Wood Construction, current edition.
 - b. Northeastern Lumber Manufacturer's Association, Inc. (NELMA).
 - c. Southern Pine Inspection Bureau (SPIB): Southern Pine.
 - d. West Coast Lumber Inspection Bureau (WCLIB): Douglas Fir.
 - e. Western Wood Products Association (WWPA): Douglas Fir and Ponderosa Pine.
 - 3. MSR Lumber Producers Council (MSR) for machine stress rated lumber.
 - 4. National Design Specifications for Wood Construction.
 - 5. National Design Standard for Metal Plate Connected Wood Truss Construction (TPI).
 - 6. AAMA 1402-86 -Aluminum Siding, Soffit, and Fascia.
 - 7. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.
 - 8. ASTM D 226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
 - 9. ASTM E 84 - Surface Burning Characteristics of Building Materials.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-engineered product. Indicate component materials, dimensions, profiles, and construction and installation details.
 - 1. Include information for specialty accessory products specified for this Project.
 - 2. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 3. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to truss fabricator.
 - 4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Sizes, stress grades, and species of lumber.
 - 2. Anchor-bolt layout.
 - 3. Structural Framing Drawings: Show complete fabrication of primary and secondary framing. Include provisions for openings and the following information:
 - a. Slope or depth, span, and spacing of truss.
 - b. Heel bearing height.
 - c. Design loading to include:
 - 1) Top chord live load.

- 2) Top chord dead load.
 - 3) Bottom chord dead load.
 - 4) Concentrated loads and their points.
 - d. Adjustments to lumber and plate design values for conditions of use.
 - e. Plate type, thickness of gauge, and size.
 - f. Lumber size, species, and grade for each member.
 - 4. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Indicate the following components:
 - a. Roof mounted items.
 - b. Wall mounted items.
 - 5. Submit Shop Drawings that have been engineered and certified by professional engineer licensed in the State in which Project is located. Include seal and signature of professional engineer on Shop Drawings.
- C. Design Data: Truss engineering calculations for loading and stresses, bearing seal and signature of professional engineer licensed in the State in which Project is located. Include the following calculations:
- 1. Minimum design shall meet design standards of latest edition of International Building Code unless other, more stringent requirements are in force in Project location.
 - 2. Bending moments and axial forces for each member.
 - 3. Basic plate design values.
 - 4. Design analysis for each joint indicating that proper plates have been used.
 - 5. Provide design calculations for exterior walls, canopies, soffit systems, and lateral bracing walls. Design wind loads and lateral bracing loads are indicated on structural Drawings.
 - 6. Submit design calculations that have been engineered and certified by professional engineer licensed in the State in which Project is located. Include seal and signature of professional engineer on calculations
- D. Samples for Initial Selection: For units with factory-applied color finish, color chart of manufacturer's standard colors.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated wood.
 - 2. Engineered wood products.
- B. Quality Control Submittals:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics.
 - 2. Certification: Manufacturer's certification that Products furnished meet specified design and performance criteria.
- C. Submit written proof of third-party inspection program in force for truss manufacturer used on Project.
- D. Certifications: Certify that specified roof and wind load requirements are met.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing and supplying Post Frame Buildings specified in this section with three years documented experience.

- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Source Limitations: Obtain engineered post frame building components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.
 - 1. Aluminum soffit system shall be fabricated and installed to comply with:
 - a. AAMA 1402-86.
 - b. International Code Council-ES Legacy- Report No. 97-64.
 - c. International Conference of Building Officials (ICBO): Report No. 2027.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store materials per manufacturer's requirements.
- B. Handle and store trusses to comply with recommendations in TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
 - 1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
 - 2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
 - 3. Provide for air circulation around stacks and under coverings.
 - 4. Store trusses to avoid contact with other materials that could create staining or discoloration.
- C. Inspect trusses upon deliver to Project site and notify manufacturer immediately if members have damage from handling or show discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.7 WARRANTY

- A. Manufacturer's Special Warranty - Treated Material: Manufacturer agrees to repair, restore, or replace columns that fail in materials within specified warranty period.
 - 1. Warranty Period: 50 years from the date of Substantial Completion.
 - 2. Manufacturer shall repair treated structural columns that fail because of insect damage or because of decay that occurs under normal conditions and proper use. If manufacturer is not able to repair structural posts to satisfaction of Architect and Owner, manufacturer shall replace damaged treated structural columns.
- B. Special Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes the following:
 - a. Color fading more than 5 Hunter units when tested per ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested per ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: From date of Substantial Completion, 50 years on chalk; 30 years on color change, Soffit: Fifty (50) year lifetime limited, non-prorated, transferable warranty.
 - 3. Warranty Exclusions: Manufacturer will not warrant metal panel finishes damaged due to exposure to atmospheric pollutants including animal waste or other corrosive conditions. Manufacturer will not warrant labor by others.
 - 4. Manufacturer shall repair painted steel roofing or siding panels if the paint peels, cracks, checks, flakes or blisters to an extent that is apparent by ordinary outdoor visual observation when exposed to normal weather and atmospheric conditions. If

SECTION 13340 - ENGINEERED POST FRAME STRUCTURES

manufacturer is not able to repair steel panels to satisfaction of Architect and Owner, manufacturer shall replace damaged steel panels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: **27'W x 73'L x 10'H** (Truss Bearing) Pole Building. Refer to the drawings for specific building size and related requirements.
- B. Subject to compliance with requirements, provide products from one of the following manufacturers (Or Approved Equal):

Stoltzfus Builders

50 Northview Dr
Lititz, PA 17543

Contact: Eli Stoltzfus

Phone: 717.664.3540

Fax: 717.665.7540

stoltzfusbuilders@dejazzd.com

www.stoltzfus-builders.com

Pioneer Pole Buildings

716 Route 183 South
Schuylkill Haven, PA 17972
Local: 570-739-0078 ext. #141
Toll Free: 1-888-448-2505
Fax: 1-888-448-2515

Contact: Heather Evans

hevans@pioneerpolebuildings.com

<https://pioneerpolebuildings.com/>

Energy Panel Structures, Inc.

102 East Industrial Park
Graettinger, IA 51342

Toll Free: 800.967.2130

Fax: 712.859.3275

Email: sales@epsbuildings.com

Website: www.epsbuildings.com

- C. Or Approved Equal.

2.2 PERFORMANCE CRITERIA

- A. Design Requirements:
 - 1. Design wood members per formulas published in National Design Specifications (NDS) for Wood Construction.
 - 2. Design light meta-toothed connector plates and joint design in compliance with Truss Plate Institute's (TPI) National Design Standard for Metal Plate Connected

Wood Truss Construction.

3. Include unbalanced roof loads required by ASCE-7, current edition.

2.3 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPAC U1; Use Category UC3b for exterior construction not in contact with ground and Use Category UC4a for items in contact with ground.
 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 2. For exposed items indicated to receive stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Maximum moisture content of 19 percent or per appropriate grading rules. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of inspection agency approved by ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 1. Laminated columns.
 2. Baseboards.
 3. Hold down blocks.

2.2 MATERIALS - WOOD

- A. LAMINATED FOUNDATION POSTS AND FOUNDATIONS:
 1. Factory-fabricated from minimum 3 ply, 2 inch by 6-inch glu-laminated, poles (10' on center MAX). See drawings for post spacing.
 - a. #1 or better southern yellow pine (or Doug Fir), Kiln dried to 19% moisture content.
 2. Columns to 20 Feet Lengths: Full-length (unspliced) nail laminated plies. Provide middle ply with short truss support block.
 3. Columns over 20 Feet Lengths: Spliced laminated plies per approved Shop Drawings and manufacturer's design.
 4. Preservative-Treatment: Foundation posts shall be pressure treated with a wood preservative to a retention of 0.8 pounds per cubic foot and kiln dried after treating to 19% maximum moisture content. The wood preservative shall be Chromated Copper Arsenate Type 111, Oxide type; or equal as listed in Federal Specification TT-W-571J. The preservative shall penetrate 100% of the sapwood. A letter of certification from the wood preserver shall be furnished with certifies the 0.8 pcf preservative retention for a 0.75" assay zone.
 5. Alternative pre-engineered post foundations (Perma-Column or Approved Equal) are acceptable.
 6. Posts can be solid sawn, mechanically laminated, glue laminated or wood composite however all methods must meet the intended allowable design stresses and be treated for members in contact with the earth.
 7. The foundation posts shall be accurately placed and shall extend 4'-0" minimum below grade. The base of the post shall have (2) 2x6x20", nailed to the 5 1/2" face of the posts (3-20d common each side) and shall have a 2x10x20" base nailed to the underside of the posts and 2x6s.
 8. Base of post shall be set on a precast or cast in place foundation. The foundation shall have a minimum of 4,000 psi compressive strength concrete mix. The foundation shall bear on undisturbed soil.
 9. Foundation size shall be determined from applied structural loads and 2,000 psf presumptive soil bearing capacity. After accurate placement of foundation and posts, the hole shall be backfilled with dry, debris-free dirt compacted in 8" lifts.

- B. LAMINATED UPPER POSTS:
 - 1. No. 1- No. 2 or better, Southern Pine (or Doug Fir), nail and glue laminated repetitive S4S members of 19% maximum moisture content shall be sized according to dimensions of structure and required structural loads.
- C. FOUNDATION POST TO UPPER POST CONNECTION:
 - 1. The foundation post to upper post connection to be adequate for all imposed bending and axial forces.
- D. SPLASH BOARDS:
 - 1. Splashboards are No. 1- No. 2 or better, Southern Pine (or Doug Fir), nominal 2x8 S4S pressure treated to a net retention of 0.6 pounds per cubic foot with MCQ in accordance with American Wood Preservers Association Specification C2, with barrier tape.
- E. EAVE BOARD:
 - 1. Sidewall eave boards (top plate) shall be 2x12 No. 2 Spruce-Pine-Fir or better and shall be placed on each side of the Post.
- F. SPECIFICATION FOR METAL PLATE CONNECTED WOOD TRUSSES:
 - 1. Trusses shall be pre-engineered, with loading that exceeds State Building Code, minimum 2 x 6 top and bottom chord. Truss spacing shall be determined by building manufacturer's design engineer (4' on center Max).
 - 2. All lumber used in the design of wood trusses must be cured and graded in accordance with the current grading rules. Design stresses allowed are those listed in the current editions of respective lumber association's grading rules.
 - 3. The design of wood members must be in accordance with the formulas published in the current edition of the National Design Specification for Wood Construction.
 - 4. Metal connector plates and joint design must conform to specifications as set forth in the current edition of the recommended design practice of the Truss Plate Institute, Inc. Entitled Design Specification for Metal Plate Connected Wood Trusses (TPI-95).
 - 5. Truss members and joints must be designed in accordance with TPI-95. All trusses Designs must be accompanied by complete and accurate shop drawings bearing the seal of a Professional or Structural Engineer, registered in the project State, and contains the following information:
 - a. Slope of depth, span and spacing of the truss.
 - b. Location of all joints.
 - c. Bearing width.
 - d. Design loading to include, as applicable:
 - 1) Top chord live load.
 - 2) Top chord dead load.
 - 3) Bottom chord live load.
 - 4) Bottom chord dead load.
 - 5) Concentrated loads and their points of application
 - e. Adjustments to lumber and plate design values to include modification for, as Applicable:
 - 1) Moisture service conditions.
 - 2) Temperature.
 - 3) Preservative treatment.
 - 4) Fire retardant treated wood.
 - 5) Duration of load.
 - 6) Flexure.
 - 7) Shear.
 - f. Each reaction force.
 - g. Each axial force (Heel panel axial forces shall not exceed 25,000#)
 - h. Lateral bracing requirements:

- 1) Top chord brace (roof purlins) spacing.
 - 2) Bottom chord brace spacing.
 - 3) Web bracing, as applicable.
 - i. Plate type, thickness or gauge, size; basic plate design value (specifying gross or Net value); and the dimensioned location of each plate except where symmetrically located relative to the joint interface.
 - j. Lumber size, species, and grade for each member.
- G. Wall Girts: Wall girts shall be 2x6 (unless noted) No. 2 Southern Pine, 19% maximum moisture content spaced approximately 24" o.c., with all ends bearing into wide face of post.
- H. Purlins and Truss Ties: 2 inch by 6 inch laid on edge, MSR SPF 1650.
 - 1. Purlins may be installed over top chord of truss, flat, or in purlin hangers. Where purlins and truss ties are set in hangers, provide 2 inch by 6 inch laid on edge, MSR SPF 1650 or No. 1 or better Southern yellow pine.
 - 2. Continuous 2x6 lateral bracing shall be provided as required in truss specification.
- I. Overhang Framing: Fabricated rafter frames.
 - 1. Provide factory beveled fascia boards, 2 inch by 6 inch Spruce-pine-fir, No. 2.
- J. Wind Bracing:
 - 1. 2 inch by 6 inch, No. 2 or better Spruce-pine-fir from end wall column to first truss back.
 - 2. 2 inch by 6 inch diagonal in roofline bracing as required by design.
- K. Framing Around Openings:
 - 1. Provide 2 inch by 6 inch, No. 2 around door, window, and overhead sectional door openings.
 - 2. All openings shall be framed to proper size and trimmed to cover all exterior edges with pre-painted flashings.
- L. Headers: Provide built-up No. 1 or better Southern yellow pine headers as required to meet loading designs.
- M. Incidental Framing: No.2 or better 2 inch by 6 inch.

2.2 MATERIALS- PREFINISHED MATERIALS

- A. General: Factory-formed metal panels, roll-formed in manufacturer's facility, designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners at side laps. Include accessories required for weathertight installation.
- B. Metal Panels: Exposed-fastener metal roof and wall panels, formed with raised ribs and recesses.
 - 1. Material: Zinc-coated (galvanized) steel sheet:
 - a. Siding: 28 Gauge Frontier Panel 50 Year Warranty
 - b. Roofing: 27 Gauge Frontier Panel 50 Year Warranty - direct screw to purlins.
 - c. Exterior Finish: Siliconized polyester.
 - d. Color: Selected by Owner from manufacturer's full range.
 - 2. Rib Spacing: 2 major ribs at 9 inches on center. 2 minor ribs at 3 inches on center between major ribs.
 - 3. Panel Coverage: 36 inches.
 - 4. Panel Height: 3/4 inch.
 - 5. Insulated Roof/Ceiling with liner panel.

6. Insulated Wall with liner; liner panel at exterior and demising walls.
- C. Metal Trim: Match material and color of metal panels. Provide trim for corners, ridge lines, rakes, eaves, and panel bases.
1. Provide trim pieces as detailed on manufacturer's installation manual and as required for complete, weather tight, functional installation. Trim shall be 0.0158-inch min. thickness steel on gables, ridge, corners, base, windows, and doors with same paint finish as roofing and siding panels.
 2. Aluminum Trim: Fabricate from same material as soffit to shape, dimensions, and profile required to accommodate soffit panel and project conditions. Provide with channels to receive panels, flanges for concealed weather tight attachment, and slotted attachment holes. Color shall match or coordinate with soffit color. In order to eliminate or minimize visible joints, form in longest possible lengths with 10 feet being minimum.
 3. J-channel: ½ inch wide channel to receive soffit panels with ½ inch attachment flange.
 4. Reverse Frieze Molding: F-shaped piece with ½ inch wide channel to receive aluminum soffit panels.
 5. Soffit T-Bar: Double channel to receive two soffit panels with exposed face
 6. Lengths: Minimum 10 feet.
 7. Trim, overhang facias, track covers, and slide door jambs available in building panel covers.
 8. Overhead Sectional Door and Slide Door Jamb Trim: Fabricated from 1 piece up to 10 feet in length.
- D. Soffits and Gables: As noted on the drawings, provide 36" overhang at soffits and 12" overhangs at gables. Materials to be aluminum or galvanized steel, vented as required. Colors shall match roof and wall panel colors.
1. Soffits shall be fabricated and installed to withstand positive and negative wind pressure loads in accordance with applicable codes.
 2. Soffit system to accommodate without damage to components or failure of weather barrier movement caused by seasonal temperature cycling and deflection of structural support framing.
 3. Moisture entering or condensation occurring within soffit system shall drain to exterior.
 4. Type: Fully vented, hi-tensile, double V-groove soffit panel with installation flanges along both edges.
 - a. Dimensions: 24 inches exposed width by 144 inches long.
 - b. Thickness: 0.016 inches.
 - c. Profile: V-grooves forming three (3) 4-inch wide panels with all panels vented.
 - d. Net Free Open Area: 11.6 square inches per linear foot.
 - e. Surface: Smooth.
 - f. Finish Color: As selected by Owner from Standard color options.
 5. Materials: Fabricate soffit panels and trim from sheet aluminum complying with ASTM B 209, AA3000 Alloy:
 - a. Minimum Aluminum Properties:
 - b. Ultimate Strength: 25 KSI.
 - c. Yield Strength: 22 KSI.
 - d. Modulus of Elasticity: 10,000 KSI.
 - e. Coefficient of Linear Thermal Expansion: 1.31×10^{-5} inch/inch/degree F.
 - f. Melting Range: 1175 to 1210 degrees F.
- E. Ridge Vent: Manufacturer's standard pre-engineered Universal Ridge Vent, flashings, and eave and gable trim. Field-fabricate minor flashings as indicated on approved Shop Drawings.
1. Provide manufacturer's standard ridge vents as indicated on Drawings.

2.1 RELATED MATERIALS

- A. Insulation: Faced, Glass-Fiber Blanket Insulation: ASTM C665, Type I; passing ASTM E136 for combustion characteristics.
 - 1. Surface Burning Characteristics per ASTM E84:
 - a. Flame Spread: 25.
 - b. Smoke Developed: <50.
 - 2. Thermal Resistance and Thickness: R-19, 6" in exterior walls, R-30, 15" in roof/ceilings (bottom chord of truss).
 - 3. See Specification Section 07210 - Batt insulation for additional information.
- B. Concrete Floor Slab:
 - 1. 6" thick concrete floor, 4,000 PSI with wire mesh.
 - 2. Provide 6" thick concrete slab throughout interior with expansion joint/ thermal break at doors.
 - 3. Provide continuous apron full perimeter, exterior. Refer to foundation details on the drawings for additional requirements.
- C. Roof Gutters and Downspouts:
 - 1. Gutter: Continuous 6" K-style, w/ Downspouts, 3 x 4" rectangular Aluminum.
 - 2. Colors to be selected by Owner.
- D. Walk Doors: Where indicated on Drawings, provide the following type of doors:
 - 1. See Specification Section 08100 - FRP Flush Doors and Aluminum Framing Systems.
- E. Overhead Doors: Where indicated on Drawings, provide insulated overhead doors, quantity and size as indicated on drawings.
 - 1. C.H.I. Overhead Doors; model no. 3285 or approved equal; insulated with Raynor ControlHoist Standard Commercial Operator; 1/2HP.
 - 2. Thermally insulated aluminum frame and faced sandwich panels construction, with electrostatically coated enamel paint finish.
 - 3. Track: 2"; 15" Radius
 - 4. Hinges: 11 Gauge
 - 5. 2" short stem steel ball bearing rollers
 - 6. Vision Panels: 34" x 16"; 1/2" insulated glass
 - 7. Mounting: standard bracket mount
 - 8. Color: as selected by Owner from standard color options.
 - 9. Cycles: 25,000
- F. Windows/Entrance Framing: Where indicated on Drawings, provide the following type of windows:
 - 1. See Specification Section 08412 - Aluminum Entrances and Storefronts.
 - 2. See Specification Section 08520 - Aluminum Windows.
- G. Closure Strips: Closed cell, 2 psf density polyethylene foam, premolded to match configuration of panels.
- H. Snow Guards: Provide with Snow Guards on roof. Refer to drawing details for additional requirements.

2.1 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, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153.

2. Exposed Fastener Heads: Match color of steel panel.
 3. **Where steel panels or trim is attached to preservative-treated lumber, provide fasteners of unpainted Type 304 stainless steel.**
- B. Nails, Brads, and Staples: ASTM F1667.
1. Framing Lumber: 10d, 16d and 60d ring shank nails.
 2. Machine Bolts: Minimum grade 1, A307.
 3. Metal Panels: Minimum 1-1/2 inch No. 10 screw fasteners with EPDM sealing washers bearing on weather side of metal panels.
 - a. Match color of metal panels.
- C. Sealants: Silicone type as recommended by soffit manufacturer.

2.2 FABRICATION

- A. Shop Fabricated Plate Connected Wood Trusses:
1. Shop-fabricate wood trusses in TPI inspected plant.
 2. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
 3. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
 4. 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.
 5. Position members to produce design camber indicated.
 6. Fabricate wood trusses within manufacturing tolerances in TPI 1.
 7. 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 PRODUCT HANDLING

- A. Deliver components in manufacturer's protective cartons clearly labeled as to specific products contained.
- B. During delivery and storage keep cartons flat and supported along entire length.
- C. Store material off ground, out of weather, in dry place. Provide ventilation. Protect from falling objects and construction activities.
- D. Handling: Avoid gouging, scratching, and denting.

3.2 EXAMINATION

- A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.
- C. Engage land surveyor to perform surveying.

- D. Verify that mechanical and electrical utilities are in correct position.
- E. Proceed with erection only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent framing, connections, and bracing are in place unless indicated otherwise.

3.4 ERECTION OF FRAMING

- A. General: Do not use materials that are unsound, warped, improperly finished, or with defective surfaces, sizes, or patterns.
 - 1. Comply with frame manufacturer's approved Shop Drawings for details and building erection.
 - 2. Comply with NFBA document "Accepted Practices for Post-frame Construction Framing Tolerances."
- B. Columns:
 - 1. Auger hole to depth of diameter indicated on Drawings.
 - 2. Pour ready mix concrete pad in bottom of each hole per Drawings.
 - 3. Install hold down blocks at bottom of each column per approved Shop Drawings.
 - 4. Accurately position column in hole.
 - 5. Backfill with dry soil compacted in 8-inch lifts.
- C. Baseboards: Install 2 runs of 2 inch by 8-inch tongue-and-groove plank, at grade, using manufacturer recommended fasteners.
- D. Wall Girts: Install at centers indicated on Drawings.
 - 1. If required, install overhang framing at top of wall girts.
- E. Trusses:
 - 1. Set trusses in place in center of column using lifting methods as approved by manufacturer.
 - 2. When trusses are properly positioned, install 1/2 inch by 5-1/2-inch machine bolt and manufacturer recommended 20d ring shank nails through 2 of column laminates and truss heel.
 - 3. Brace trusses per WTCA guidelines and BCSI Manual
- F. Purlins: Install purlins with fasteners and at spacings per approved Shop Drawings.
- G. Truss Ties: Install truss ties at locations recommended by structure manufacture and per approved Shop Drawings
 - 1. Run truss ties from end wall to end wall.
- H. Incidental Framing: Install 2 inch by 4 inch or 2 inch by 6 inch blocking as required per structure manufacturers recommendations.

3.5 METALS INSTALLATION, GENERAL

- A. Install metal panels per manufacturer's established construction procedures.
- B. Install metal panels and components plumb, square, straight, and true to lines, and to assure freedom from rattles.

- C. Take care when cutting prefinished materials to ensure cuttings do not remain on finished surface.
- D. Properly install fasteners taking care to not under- or overdrive.

3.6 METALS INSTALLATION

- A. Field Cutting: Accurately measure and cut soffit panels and trim. Use power circular saw with 10-point aluminum cutting blade, duckbill sheet metal snips, or hacksaw as recommended by manufacturer for specific cutting operation.
- B. Trim: Prior to installing soffit panels, locate and anchor perimeter to receive channels. Install trim items at base, corners, top of steel siding, fascia, gables, and ridges using no less than 1 inch screw fasteners.
- C. Wall Panels: Install metal panels perpendicular to wall girt and purlin supports, aligned level and plumb. Anchor with fasteners at spacings recommended by manufacturer and design loads.
- D. Soffit Panels:
 - 1. Layout panels as detailed on approved shop drawings. Provide vented panels to provide sufficient ventilation of space above soffit. A combination of solid and perforated soffits shall be provided for balanced ventilation at side overhangs.
 - 2. Insert panel into receiver channel, flex panel, and insert other end into opposing receiver channel. Ensure panels are perpendicular to perimeter and aligned. Fasten panel to supports by nailing through attachment flanges.
 - 3. Overlap, engage, and lock subsequent panels over preceding ones.
 - 4. At corners, miter cut soffit panels and install with soffit T-bar. Align joints and grooves of intersecting panels.
- E. Expansion Joints: Where soffit panel engages receiver channel and where aluminum components butt or adjoin other materials, leave expansion gap:
 - 1. Hot weather with aluminum components partially expanded: 1/16 inch.
 - 2. Cold weather with aluminum components partially contracted: 1/8 inch.
- F. Fastening: Install panels and trim with nails. Where exposed, use trim nails with color to match aluminum components.
 - 1. Drive fasteners straight and level. Do not slant fasteners.
 - 2. Do not drive head of fastener tightly against attachment flange. Allow 1/32 inch clearance between fastener head and aluminum surface.
 - 3. Do not place fastener through face of soffit panel.
 - 4. Spacing: Fasten soffit panels at 24 inches maximum.
- G. Sealants: Apply sealants where indicated on manufacturer's approved shop drawings and as required to provide weather tight installation. Depth of sealant bead shall be ¼ inch minimum.
- H. Roofing Panels: Install panels perpendicular to supports aligned straight with end fascias and fasten to purlins. Anchor with fasteners at spacings recommended by manufacturer and design loads.

- I. Vented Ridges: Fasten vented ridges to structure as indicated on Drawings, maintaining manufacturer's minimum clear throat opening.
- J. Closure Strips: Provide closure strips at top and bottom of roofing panels.
 - 1. 1" wide closed-cell linked expanded polyurethane, to match panel corrugation.

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. It is the intent of these specifications to include all material, service and labor necessary to form a complete and properly operating whole.
3. Where equipment is shown on plans and specified as a single unit in specifications, the equipment quantities shall be per plans. Provide a complete operating system for all equipment.
4. Where reports and/or requirements are specified herein as a single report, it is the intent that each requirement and/or report be separate for each school, i.e. commissioning report, operation instructions, etc.
5. Specifications for certain equipment or performance may not be applicable for all areas. Refer to the plans for where equipment and/or performance are required.

1.02 CONTRACT DRAWINGS

1. Examine all drawings and specifications. 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 in 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 and/or Contractor.

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 all authorities having jurisdiction.
2. All electrical work shall comply with latest edition of the NEC National Electrical Code.

SECTION 15010 – GENERAL REQUIREMENTS.

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 no additional cost to Owner or others.
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.
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 PROGRESS

1. See Specification Sections 01040-Coordination, 01310-Construction Progress and 01315-CPM Schedule.

1.06 SHOP DRAWINGS AND SUBMITTALS

1. See Specification Section 01300 – Submittals.
2. Ductwork and piping shop drawings shall be prepared at 1/4" scale (minimum).
3. The Contractor shall provide a written report stating whether or not any equipment furnished is eligible to receive a Program Incentive payment through the NJ Clean Energy Commercial and Industrial Program (New Jersey SmartStart Buildings®). The report is to be submitted with original shop drawing submittal. Report shall include all supporting equipment specification sheets, applicable AHRI Certificate and any other documentation required.

Listed below are the types of qualifying equipment & approved technologies listed by New Jersey SmartStart Buildings® that may qualify incentives which require a report be submitted from each equipment manufacturer for each equipment item submitted. (Note: a negative report MUST be submitted where applicable)

Electric Unitary HVAC

- Unitary HVAC & Split Systems
- Controls
- Occupancy Controlled
- Thermostats

1.07 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 approved equal"

SECTION 15010 – GENERAL REQUIREMENTS.

and "equivalent 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 equivalents or substitutions shall be provided as specified.

2. Where Contractor proposes to use equipment 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 coordination drawings and detailing required by other contractors and/or professionals shall be paid by Contractor at no additional cost to Owner.
3. Where such deviations from equipment specified and/or indicated on plans, require a different quantity and/or arrangement of any duct work, piping, electrical work, wiring conduit and/or equipment that would have been required for equipment. Where Contractor proposes to use alternate methods of equipment (i.e. field constructed) rather than packaged equipment, this shall be allowed. 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. Contractor shall pay for all costs incurred due to such deviations at no additional cost to the Owner.

1.08 REJECTED MATERIALS

1. See Specification Section 01300-Submittals and the AIA Document A201-2017 General Conditions of the Contract for Construction.

1.09 WORKMANSHIP

1. See Specification Section AIA Document A201-2017 General Conditions of the Contract for Construction.

1.10 WARRANTY

1. See Specification Section 01740 – Warranties and Bonds.
2. Provide a 2-year warranty period from the date of Substantial Completion.
3. Filter Change - See Specification Section 15010 "Filter Changes".

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 Section 15930 for additional requirements for control system.

1.12 AS-BUILT DRAWINGS

1. See Specification Section 01700 – Project Closeout

1.13 FIRE RATING

1. All materials used anywhere in the work must have NFPA 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".

1.14 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. 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.

1.15 EQUIPMENT FURNISHED BY OTHER TRADES

1. All equipment furnished and/or installed by other trades requiring connections and services by Contractor shall have such services provided by Contractor.
2. Contractor shall verify exact requirements with approved shop drawings supplied by the equipment contractor and/or supplier prior to construction.
3. Contractor shall verify locations, sizes and requirements of all services to equipment, in field with the equipment contractor prior to construction.

SECTION 15010 – GENERAL REQUIREMENTS.

1.16 FACTORY TESTING

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.**
2. All factory assembled packaged equipment shall be fully quality tested by factor run testing under normal operating conditions. Quality control system shall automatically perform via computer; triple leak check, pressure tests, evacuation and accurately charge system, perform detailed heating and cooling mode tests, and quality cross check all operational and test conditions to pass/fail criteria.
3. Detailed report card will ship with each unit displaying status for critical tests and components.
4. If unit fails on any cross check, it shall not be allowed to ship. Serial numbers will be recorded by factory and furnished to contractor on report card for east of unit warranty status.

PART 2 PRODUCTS

2.01 ELECTRICAL EQUIPMENT

1. Contractor shall furnish all his equipment complete with motor, controllers, capacitors and starting equipment.
2. Electric motors shall be premium high efficiency (refer to table below for minimum 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 by 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.

Premium high efficiency motors shall have efficiencies equivalent to or greater than listed below.

<u>SIZE/HP</u>	<u>1800 RPM ODP NEMA NOMINAL EFFICIENCY</u>	<u>1800 RPM TEFC NEMA NOMINAL EFFICIENCY</u>
1	85.5%	85.5%
1.5	86.5%	86.5%
2	86.5%	86.5%
3	89.5%	89.5%
5	89.5%	89.5%
7.5	91.0%	91.7%

3. For existing equipment that is shown to be replaced, the existing Sterling equipment shall be removed and replaced with new Sterling equipment. Note – Existing Sterling equipment type shall be verified.

SECTION 15010 – GENERAL REQUIREMENTS.

4. 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.
5. 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.
6. Contractor shall set all electrical equipment furnished by Contractor 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.
7. 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.
8. Contractor shall verify all electrical characteristics of all equipment with the electrical contractor. Contractor shall submit to Electrical Contractor location of all motors, starters, all other electrical equipment, voltage and phase required prior to submission of Contractor's and/or electrical contractor's shop drawings or start of construction. 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.
9. Should Contractor change type of equipment which results in change to electrical characteristics, then Contractor will be responsible to coordinate these changes with all other trades and pay for all costs required as a result of changes.
10. Should 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. The Contractor shall furnish and install all electric power wiring required for his contract, with the exception of certain wiring shown under electrical contract. The Contractor shall furnish and install all control wiring required for his contract including power wiring to all ATC devices, panels, etc. (unless indicated otherwise on electrical plans).

2.03 RELIEF VALVES

1. Provide ASME or approved equal labeled relief valve on each closed fluid system, set to relieve full code capacity at design pressure. Pipe discharge to suitable receptor with air gap in accordance with all codes. Do not locate pipe at floor to create a tripping hazard.

2.04 GAUGE GLASSES

1. Jerguson #56 or approved equal cocks with bleed fitting and vertical rising ball check for tubular glass with four guard rods.

SECTION 15010 – GENERAL REQUIREMENTS.

2.05 PRESSURE GAUGES

1. All pressure gauges shall be Ashcroft 1020 or approved equal, 4½ size with white dial, black figures and markings. Gauges shall be provided with level handle gauge cock and steam siphon where required.

2.06 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.

2.07 TAGS

1. Contractor shall provide a 2" dia. brass tag with stamped service designation and valve numbers, fastened to each valve with brass chain and "S" hook.
2. Each control, starter, disconnect switch, etc., shall be provided with 3/4" x 2-1/2" metal name tag securely fastened to device. Name tags on controls exposed in finished spaces shall be located on inside of access door or access panel. Provide valve chart and schematic diagram along with floor plan. Both chart and diagram shall be permanently mounted with metal frame and glass front in mechanical room or other area designated by Owner. Contractor may submit alternative mounting method for Owners' review and approval.

2.08 EQUIPMENT ISOLATION

1. Provide shutoff valves on supply and balancing and shutoff valve on return lines for each piece of equipment including all radiation loops, unit heaters, coils, unit ventilators, air handling units, fan coil units and all pieces of hydronic equipment.
2. At all branch lines serving two or more pieces of equipment, provide a shutoff valve on supply and balancing and shutoff valve on return at the points where the branch line connects to main. Provide drainage and slope pipe to drain points.
3. At all branch lines from mains, whether directly feeding equipment or not, provide shutoff valves on supply and return with ability to drain branch lines.
4. All valves shall be tagged (see tags) and when installed above accessible construction, provide color coded markers (per architect's direction). Where installed above non-accessible construction, the Contractor shall provide access panels. Panels shall be marked for equipment.

2.09 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.

SECTION 15010 – GENERAL REQUIREMENTS.

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 or approved equal.
5. Equipment location tags shall be used for equipment located above acoustical ceiling. Provide white permanent adhesive one inch long by half inch-wide labels on the ceiling grid with color coded laser printed text to identify all above ceiling device, equipment and valves.

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. 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. 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.
5. Do not run pipe or conduit for mechanical 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, duct work, conduit and other mechanical materials and equipment shown to be mounted below ceilings are to be kept as close to ceiling areas as possible unless otherwise noted.
7. All items such as valves, dampers, equipment, controllers, starters, ATC panels, etc., that will be concealed in construction shall be installed and so arranged as to be fully accessible for adjustment, service and maintenance by use of access doors.

SECTION 15010 – GENERAL REQUIREMENTS.

8. Where these devices are above suspended ceiling, colored indications mounted on ceiling, markings on suspended ceiling grid, shall be submitted for review and be used to indicate such devices. Color scheme and material used for this shall be coordinated and approved by Owner and reviewed by engineer.

3.02 CLEANING

1. Upon completion of the work, 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 ensure 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 Contractors' responsibility. All solvents and other chemicals, and materials used, shall be disposed of in strict accordance with all applicable environmental codes.

3.03 STARTUP AND ADJUSTMENTS

This work is the Contractors' responsibility and not part of commissioning and is to be done prior to commissioning.

1. Equipment Startup
 - A. The Contractor shall provide all startup. Startup shall be provided by the equipment supplier for all equipment.
 - B. As part of startup, the equipment manufacturer shall provide a complete checklist of all startup requirements for each piece of equipment. This checklist, when completed, shall be provided to the architect/owner indicating that the equipment has been started up, adjusted, balanced, tested and installed in strict accordance with the equipment manufacturer's requirements and is functioning per specification.
 - C. This written confirmation shall be the equipment manufacturers' standard checklist for startup. All startup, adjustments, replacement of equipment, rebalancing, installation, and any other modification to the equipment or system required to provide the correct and/or specified performance shall be made at no additional cost to Owner. Any of the above items needed shall be indicated as part of this startup.
 - D. All equipment startup provided by the equipment manufacturer shall have written confirmation as specified above and shall be submitted to owner/architect prior to contractor submission of payment for substantial completion. Failure to provide startup reports will result in non-payment of billing for substantial completion.
 - E. Where any modifications and/or reinstallation is required as specified above and results in additional work to any other contractors or subcontractors work, this work shall be the responsibility of the HVAC contractor and shall be done at no additional cost to Owner/Architect.

SECTION 15010 – GENERAL REQUIREMENTS.

- F. Where startup is not completed in a timely manner and results in additional cost to other contractors, regardless of cause, these additional costs will be the responsibility of the HVAC contractor. These costs shall result in no additional cost to Owner.
 - G. The equipment manufacturer personnel who will do the startup and provide report shall be a certified factory trained representative whose primary function is starting up of equipment. Qualifications of the startup representative shall be provided as part of the report or inspection.
 - H. As part of startup, the Owner shall be provided operation and maintenance manuals.
 - I. As part of startup and/or inspection services after startup has been performed, the same factory trained representative shall be available for a period of classroom instruction to instruct the Owners' personnel in the proper maintenance equipment.
 - J. The Contractor shall supply the Owner with the following literature as furnished by the manufacturer, four weeks prior to startup, and have equipment manufacturer representative available for any questions.
 - Three (3) complete sets of installation drawings.
 - Field wiring diagrams.
 - Installation instructions.
 - Startup operation and maintenance instructions.
 - K. It is the intent of these specifications that the factory startup personnel have their expertise in the equipment that they are providing startup service. Where one manufacturer provides more than one type of equipment (i.e. chiller rooftops, etc.), then a factory trained representative for each different type of equipment, if necessary, shall provide startup, inspection report and/or training.
 - L. Where startup results in performance which is not in accordance with contract documents or manufacturers' specifications, Contractor shall submit to the architect the discrepancies prior to commissioning of work. Any discrepancies shall be the responsibility of the contractor and be corrected by Contractor at no additional cost to Owner.
 - M. **All of the work in this section must be completed and accepted by the Owner/Architect as a condition for issuing a substantial completion letter.**
- 2. Upon completion of initial testing and prior to final balance, Contractor, ATC subcontractor and sheet metal sub-contractor shall perform a survey and testing of the entire system. The testing shall be done with the commissioning agent and/or Owner. Contractor shall include the services of a minimum of three (3) personnel; not to include control personnel and equipment startup personnel. This report is in addition to and to be completed prior to commissioning. Balance for substantial completion will be withheld until report is completed, reviewed and accepted.
 - 3. The Contractor shall perform, but not limited to, the following;
 - A. Each individual thermostat and/or sensor shall be tested with Owner representative for proper operation and setpoint. Adjustments shall be made to setpoints, calibration, repairs, and/or replacement of defective equipment.

SECTION 15010 – GENERAL REQUIREMENTS.

- B. Each shutoff valve shall be tested and shall be set for its proper position and tagged per specifications.
- C. Each balancing valve shall be tested and tagged per specifications (suitable for balancing by commissioning agent).
- D. Each terminal device not having an electric motor, i.e. baseboard, hot water coil, chilled water coil, etc., shall be tested to determine proper setting operation in accordance with balance specifications and results recorded in balance report.
- E. Each and every new control device, valve, damper, and controller shall be tested, adjusted, repaired, and/or replaced if found defective. All wiring associated with the control system shall be tested. This shall include control transformers, wiring, electronic devices, and all equipment associated with the control system. (Also see Specification Section 15010, Factory Testing.)
- F. Each piece of packaged equipment shall be tested with the factory representative present as part of their startup and shall be tested and operated up to its full capacity. All tests of packaged equipment shall be done before and after equipment has been integrated with the remainder of the system.
- G. Each fan shall be tested, adjusted, repaired, and/or replaced and made ready for final air balance performed. Fan shall be tested before and after it has been installed and integrated into the remainder of the system.
- H. The entire automatic control system shall be tested. First, each component shall be tested to determine proper operation, calibration, performance and sequence prior to installation and/or integration into the remainder of the system. After the initial test, the equipment shall be installed and integrated into the system. After this is done, the entire system shall be tested and adjusted for proper sequence of operation, performance, function and capacity of the entire system. This equipment shall be tested from DC computer station and verified for operation in field using 2-way communication.
- I. When delivered to the job site, all new equipment in need of repair and/or replacement shall not be installed until the necessary repairs have been made. In the event equipment is required to be repaired for whatever reason, it shall be repaired and/or replaced at no additional cost to Owner, and with no interruption of service or extension of contract time and no extension of completion date.
- J. All piping shall be tested per specification. Include all valves and joints. Any leaks found shall be repaired and damaged construction replaced at no additional cost to Owner.
- K. All tests, adjustments, repair, and/or replacement of all the mechanical system shall be completed at least three (3) weeks prior to the scheduled date of substantial completion and/or commissioning agent. No extension of time will be given for contractors' failure to perform the above. No extra compensation will be given due to the "overtime" hours implicated on the requirements of this section.
- L. Upon completion of all tests, Contractor shall prepare a written report for submission to the engineer for his review. This report shall indicate the activity, time performed, results,

SECTION 15010 – GENERAL REQUIREMENTS.

initial balance points, final balance points, initial and final control settings, repair, and/or remedial work required and performed.

- M. Contractor shall schedule (submit schedule as part of shop drawing for review) all his work and testing, so that in the event there is replacement, repair, and/or adjustment to system and equipment, it shall be completed, so as not to delay substantial completion.
- 4. As a result of test, adjustments, and work necessary to perform the above, Contractor shall, at his own expense, remove and replace any construction, either his or of other contractors. It is incumbent upon Contractor to schedule the required work so as to not affect other trades or progress of other contractors' work.

3.04 OPERATING AND MAINTENANCE INSTRUCTIONS

- 1. Contractor shall prepare complete sets of bound operating and maintenance instructions for school; 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. Contractor 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. 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.

Where instructions and operation for a particular system cannot be properly done due to system not being able to be operated, i.e., cooling system in winter; Contractor shall obtain from Owner time and date when this instruction will be performed and provide instructions at that time and date when system can be properly operated. This shall be done at no additional cost to Owner and final payment to contractor shall reflect this requirement.

- 3. The Contractor shall provide to engineer for approval report indicating the itinerary of this instruction complete with duration of instructions location, time, and all other pertinent data.
- 4. The Contractor shall have manufacturers' representatives, as part of their startup, provide instruction on each piece of equipment. Where offsite instruction, due to complexity of systems, as determined by engineer of record, this shall be provided at no additional cost.
- 5. 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.
- 6. 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.
- 7. Provide a certified log of air quantities at all air supply, return and exhaust openings, 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.

SECTION 15010 – GENERAL REQUIREMENTS.

8. Provide all ASME and State pressure vessel inspection forms.
9. Provide list of all motor data, including standard and actual operating in service data.
10. Provide all manufacturer's equipment guarantees and warranties.
11. Provide a list of units, filter sizes, quantities and recommended changes. For each piece of equipment, locate filter and demonstrate filter change.
12. The contractor shall provide a video of the instructions in a format requested by the contractor of the instructions. The contractor shall assume all costs for the video.

3.05 TRAINING AND INSTRUCTION

1. Provide operating instructions shall include wiring and control diagrams showing complete layout of each system. These instruction periods shall be a minimum of:

Filter Changing	8 Hours
General System	16 Hours

Provide additional training for equipment (see specification sections for hours) as specified in equipment specification sections and control system (see Specification Section 15930).

The requirements for these instructions are in addition to the startup requirements for each type of equipment per Specification Section 15010, Part 3.03. The instructions shall be done by the contractor foreman and project manager.

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, 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 Contractor color as selected. Submit for approval. All surfaces shall be prepared for painting and/or constructed of materials suitable to be painted.
5. All tags, labels and other removable instructions not required by the manufacturer to remain on equipment shall be removed.
6. Remove all labels and tags on sheet metal for exposed duct and duct above ceiling.

SECTION 15010 – GENERAL REQUIREMENTS.

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.
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 International Energy Conservation Code, latest applicable edition; or such code as locally applicable, if more restrictive.

3.09 FLASHINGS

1. All piping passing through roofs shall be provided with Stoneman "Stormtite" or approved equal seamless lead flashing.
2. All ducts penetrating roof shall be provided with curbs, flashing, counterflashing and flashing collar welded to duct. Coordinate exact requirements with roofing contractor or roof bonding agent.

3.10 EQUIPMENT INSTALLATION

1. Rooftop equipment installed within 10' of edge of roof shall have a painted guard, provided by Contractor, at edge of roof, top of guard to be minimum 42" above roof surface, constructed to prevent passage of 2" diameter sphere.
2. Mounting, details, color, and arrangement of guard shall be submitted for review. Coordinate all details with all other contractors.

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 Contractor.

<u>EQUIPMENT</u>	<u>MANUFACTURERS</u>			
	<u>NUMBER 1</u>	<u>NUMBER 2</u>	<u>NUMBER 3</u>	<u>NUMBER 4</u>
Exhaust Fans	Cook	Greenheck	Pennvent	Or approved equal
Air Devices	Metal Aire	Tuttle Bailey	Anemostat	Or approved equal
Valves	Mueller	Stockham	Nebco	Or approved equal
Vibration Isolation	Mason Industries	Vibration Mountings		Or approved equal
Insulation	Owens Corning	John Manville	Knauf	Or approved equal
Air Vents	B & G	Sarco	Taco	Or approved equal
Louvers	Air Balance	Penn Vent	Portnoff	Or approved equal
Ductless Split System	Carrier	Mitsubishi	Samsung	Or approved equal
Gravity Ventilator	Cook	Greenheck	Pennvent	Or approved equal

SECTION 15010 – GENERAL REQUIREMENTS.

3.12 SCHEDULE OF WORK AND COMPLETION DATES

1. The exact times and dates and schedules that the projects will be available for 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. Contractor shall store, take deliveries and install all equipment in accordance with manufacturers' requirements (see "General Conditions").

3.14 ALTERNATE BIDS & UNIT PRICES

1. See "General Conditions" for all alternate bids and unit prices. See plans and specifications for extent of work.

3.15 CONSTRUCTION SEQUENCING

1. Refer to General Conditions for the overall contract staging. However, specific items for the contractor should be noted. The following are suggested methods of staging 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 as 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, 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 Contractor).
6. All new ductwork and piping shall be installed and coordinated with proposed new work.
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

SECTION 15010 – GENERAL REQUIREMENTS.

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. All work associated with compliance of this section shall be the responsibility of Contractor.
11. Contractor shall provide, prior to doing any work, schedule and provide procedure for accomplishing the work.

3.16 ALLOWANCE

1. Contractor shall provide as part of his bid a total allowance for items specified in General Conditions and Specification Section 15010.

3.17 FILTER CHANGES

1. Contractor to be responsible for three (3) sets of filters for all equipment with filters. One set installed on equipment from factory. Install a second set of filters prior to balancing. Install a third set of filters following substantial completion at the start of the 2-year warranty period.
2. These filters are in addition to the filter required for service and filter changes per Section 15010, Part 1.11 – Maintenance Service.

3.18 RELOCATION OF EXISTING EQUIPMENT

1. 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. The 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.

3.19 PROTECTION OF SERVICES DURING CONSTRUCTION AND DEMOLITION

1. 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. 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. Contractor shall be held responsible for all damage so done until his work is fully completed and finally accepted.

SECTION 15010 – GENERAL REQUIREMENTS.

4. It shall be the responsibility of Contractor to protect all existing construction and new motors, HVAC equipment, pumps, electrical equipment, plumbing fixtures and all construction during all phases of construction.

3.20 CUTTING AND PATCHING

1. Where ducts are removed from louvers in exterior wall, the louver shall remain and have insulation between sheet metal. Sheet metal painted (R=8) (caulked) and patched to match existing.
2. Unless otherwise specified and/or shown on architectural, HVAC and/or structural plans and specifications, to be done by general contractor, 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.
3. Cutting shall be done only after shop drawings have been prepared and with the Architect's approval. The 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.
4. The Contractor may hire the other prime contractors to perform this work or hire a pre-qualified, independent contractor. The 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.
5. Wherever previously unfinished areas are exposed by the removal of existing equipment, these areas shall receive new finishes to blend into the adjoining work.
6. Wherever existing chases must be enlarged to encase new work, they shall be enlarged to match the existing construction
7. Wherever fire rated material must be patched, it shall be patched in a manner not to affect its fire rating.
8. 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.
9. 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.
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.

SECTION 15010 – GENERAL REQUIREMENTS.

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. The Contractor shall remove and replace all ceilings required for his work with the exception of ceilings shown to be removed by the Contractor.

3.21 NEW ROOF OPENINGS IN EXISTING ROOFS

1. Unless otherwise shown on plans, the Contractor shall cut all new openings in roof. Structural work by steel contractor or general contractor. The Contractor shall provide flashing and counterflashing for openings. The Contractor shall provide all curbs and equipment. Structural steel must be installed prior to cutting holes.
2. HVAC contractor shall verify opening locations by use of coordination drawing developed by Contractor. Prior to any cutting or construction, the Contractor shall physically mark locations for all other prime contractors.
3. Once hole is cut, prior to duct or equipment being set, the Contractor shall temporarily protect the opening. After duct and/or curb or equipment is permanently installed by HVAC and flashed and counter flashed by the Contractor, and opening is weatherproofed, it shall be the responsibility of the Contractor for any water damage.
4. As part of the coordination, the Contractor shall provide a schedule agreed to by all parties so that the new openings are permanently closed as soon possible. No opening shall be left temporarily sealed for an extended period of time, as determined by the construction manager.

3.22 REMOVAL OF EXISTING EQUIPMENT ON EXISTING ROOF

1. Contractor shall remove existing equipment including all duct, duct supports, pitch pockets, control wiring, electrical wiring (to closet point of termination), all piping and appurtenances. Where removal requires new roofing, this work shall be done by the general contractor.
2. Contractor shall remove existing equipment and provide shop drawings to all contractors for their review. The shop drawings are to include proposed schedule, locations, sizes and other pertinent details. The Contractor shall provide a temporary waterproof enclosure. Existing curb shall remain. The Contractor to provide permanent cap where curbs are to remain. See architectural and structural plans for details.
3. Where existing curbs are to be removed, these shall be removed by the Contractor and general contractor to provide permanent roofing.
4. As part of the coordination, the contractor shall provide a schedule agreed to by both parties so that the existing openings are permanently closed as soon possible. No opening shall be left temporarily sealed for an extended period of time, as determined by the construction manager.

3.23 REMOVAL

1. The Contractor shall remove existing systems as indicated on drawings.

SECTION 15010 – GENERAL REQUIREMENTS.

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 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. 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 Contractor.
5. All debris in areas occupied by the building personnel during periods of building operation shall be removed daily.
6. The 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. The Contractor shall visit site to determine extent of work and all conditions.
8. Where existing louvers are shown to be removed, the Contractor shall remove and provide temporary closure provide permanent construction unless otherwise specifically indicated.

3.24 BUILDING ALTERATION WORK

1. The Contractor shall furnish all labor, equipment and materials required to complete alteration work in the building. Unless otherwise indicated on architectural drawings, 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 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. The 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.

SECTION 15010 - GENERAL REQUIREMENTS

5. Contractor shall either retain qualified independent contractors or utilize the other on-site contractors. The Contractor shall assume all requirements for any conflicts with union policy and be responsible for same. The 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
15010.6360F

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. 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. 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 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 A-13 and Rust-Oleum Corporation Form # 117 or approved equal. Paint identifying band 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.
2. All new exposed pipe in any occupied area including insulation, hangers, supports and all appurtenances, shall be painted color to match existing. All equipment without factory finished paint shall be painted. All painting shall receive two coats as specified for painting (see Section 15010).

Color Coding

Hot Water Primary Supply Return	Red
Hot Water Secondary Supply Return	Dark Red

SECTION 15110 - BASIC MATERIALS AND METHODS

3. 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.
4. 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 equivalent 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 2 psi in 24 hours.
2. 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.
3. Where new pipe is shown or required to be connected to existing pipe or equipment, existing and new pipe shall be tested. Tests for new pipe and equipment in existing areas shall be done only after building normal occupied period. All tests shall be done in such a manner as to avoid injury to building personnel and protection of existing construction from damage which may occur, due to test or failure of test and/or tested material.
4. In existing building, all required tests on new and/or existing systems shall only be done after normal school 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.

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 P.S.I.

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 equivalent 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.
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.

SECTION 15110 - BASIC MATERIALS AND METHODS

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 125 psi WSP, 200 psi WOG with renewable composition disc. Underground AWWA standard iron body, double disc, gate valves shall be used.
2. All valves 2½" or larger shall be butterfly valves; 125 psi WSP. Valves shall be provided with back seat to permit packing under line pressure. Swing check valves shall be of similar construction with renewable, regrinding, bronze disc and seat.
3. All valves used for throttling shall be globe type with 500 Brinell full plug and removable seat.
4. Non-slam checks shall be used on all pump discharges, elsewhere at contractor's option.

2.04 PLUG AND BALL VALVES

1. Plug and ball valves shall be 150 psi WOG with full port. Valves used for balancing shall have infinite throttling handle and adjustable stops. All valves bubble tight shut-off.
2. All valves 2½" or larger shall be 125 psi WSP, 200 psi WOG bronze mounted, silicon bronze stem, outside screw and yoke, bolted bonnet and followed 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.

SECTION 15110 - BASIC MATERIALS AND METHODS

2.05 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.
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 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.

2.07 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.

2.08 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.

2.09 ANCHOR BOLTS

1. Contractor shall furnish and install anchor bolts as required for the equipment. Anchor bolts shall be DECO (or approved equal) standard anchor with floating nut, adjustable ½" in any direction. Grout all bases.

2.10 DRIP PANS

1. Provide drip pans of adequate size for all pipes and equipment carrying liquid or, liquid vapors where pipes pass over areas or equipment requiring protection. Drip pans shall be constructed of stainless steel, minimum 20-gauge, provide 3" deep pan. Provide drain line to closest sanitary line (minimum 2" diameter).

2.11 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.

SECTION 15110 - BASIC MATERIALS AND METHODS

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.

2.12 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 ¼" 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.
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.

SECTION 15110 - BASIC MATERIALS AND METHODS

2.13 CONDENSATE REMOVAL

1. All condensate pipe shall be copper and installed at a minimum of ¾" 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 equivalent 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 ¾" 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.
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.
6. Provide condensate pump where gravity flow is not practical or possible.
7. As part of contract, Contractor shall include installation of (3) additional pumps, including all pipe and electrical work.

2.14 LINTELS

1. The Contractor will furnish and install all lintels required for the installation and completion of all work of 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 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.

2.15 AUXILIARY DRAIN PANS

1. Provide auxiliary drain pans under units containing cooling coils where units are located above suspended ceiling or furred space and where there is a blockage of condensate system resulting in overflow which will cause damage.
2. Drain pans shall be constructed of stainless steel, minimum .0276" and minimum 1½" deep, extending 3" beyond unit.
3. For all equipment above finished spaces; provide a water level detector in auxiliary drain pan which shall automatically de-energize unit upon detection of water. Overflow cut-off switch shall be EZ Trap Model EZT-225 or approved equal suitable for vertical and horizontal installation. Contractor shall be responsible for all wiring.

SECTION 15110 - BASIC MATERIALS AND METHODS

4. On secondary drain lines, provide a water level detector in overflow line which shall automatically de-energize unit upon detection of water. Overflow cut-off switch shall be EZ Trap Model EZT-225 or approved equal suitable for vertical and/or horizontal installation. The Contractor shall provide all wiring.

PART 3 EXECUTION

3.01 EXCAVATION AND BACKFILL

1. 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. 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. 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 6" 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.

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. 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.

SECTION 15110 - BASIC MATERIALS AND METHODS

6. 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. Contractor to coordinate all pipe runs with other contractors. Where coordination of 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 finished spaces 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. (See Sections 15180 & 15181)

3.03 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.

3.04 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.

3.05 FOUNDATIONS

1. Foundations shall be provided by 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 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. Provide concrete pad for boiler and all equipment requiring concrete pads per structural/architectural plans.

SECTION 15110 - BASIC MATERIALS AND METHODS

3.06 STRUCTURAL STEEL

1. 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 responsibility of 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.

3.07 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.

END OF SECTION
15110.6360F

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 and/or modifications of existing insulation for new work.
3. All insulation thickness and R Value shall be installed in accordance with ASRAE 90.1, latest edition.

1.02 UNIT PRICES & ALLOWANCES

1. See General Conditions and Specification Section 15010.

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. 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, insulation shall have stainless steel jacket same as indicated for outdoor pipe, except with no exposed joints or seams.
5. All refrigerant pipe insulation shall be Armaflex. Pipe shall be installed in strict accordance with manufacturer. Pipe shall be tested prior to commissioning for improper installation resulting in condensation. The Contractor is cautioned that the seals on pipe shall be installed and tested per manufacturer requirements.
6. All refrigerant piping (except hot gas) throughout the work shall be insulated with a 3/4" (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 and all outside air ductwork shall be insulated with high density fiberglass rigid insulation in catwalk areas, blanket insulation in all other areas, 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 2021 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 (R-8.0).
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 or partitions required to be fire rated. Duct insulation at rated enclosure shall have insulating material in accordance with applicable code.

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 rigid 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.
7. Hot water pipe in radiation enclosure no insulation.

SECTION 15180 - INSULATION

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 manufacturers' 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 2021 International Energy Efficiency Code (Latest applicable edition), Table C403.12.3 or local requirements and the following table:

Fluid Design Operating Temp. Range (°F.)	Insulation Conductivity		Nominal Pipe or Tube Size (in.)				
	Conductivity Btu·in./(h·ft²·°F)	Mean Rating Temp. °F	<1	1¼ to <1½	1½ to 4	4 to <8	≥8
201-250	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141-200	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140	0.21-0.28	100	1.0	1.0	1.5	1.5	1.5
40-60	0.21-0.27	75	1.0	1.0	2.0	2	2
<40	0.20-0.26	50	0.5	1.0	1.0	1.0	1.5

- A. For piping small than 1½" and located in partitions within conditioned spaces, reduction of these thickness by 1" shall be permitted, but not to a thickness less than 1".

SECTION 15180 - INSULATION

2. Where piping runs outdoors, increase insulation thickness to 2-1/2".
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
15180.6360F

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 and existing 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. The 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, i.e. 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 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 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 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 the 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 the 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 the 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 of 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. The 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. The Contractor shall be certified by N.E.B.B. or A.A.B.C.
8. The 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 in 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 a 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. The 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, the 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 WATER SYSTEM PROCEDURES

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. All heat transfer equipment, heating and cooling elements and primary and secondary takeoffs.

A. Design Data

- MBH specified
- GPM specified
- Entering Water Temperature (E.W.T.)
- Entering Air Temperature (E.A.T.)
- Water Temperature Drop (W.T.D.)

SECTION 15190 - TESTING AND BALANCING

- Element type specified

7. Water quantities and capacity shall be measured by temperature taken.

2.06 SOUND TEST PROCEDURES

1. Tests to demonstrate compliances with sound requirements shall be made at the following selection points.

- 5 selected unit ventilator locations, various type systems which shall include condensing unit and exhaust fans.

2. Take sound level measurements at times when the building is unoccupied. Take measurements with all equipment secured. Measure sound levels at any point within a room not less than 6 feet from an air terminal or room unit, and not closer than 3 feet from any floor, wall, or ceiling surface.

3. Measure sound levels with a sound meter complying with the latest ANSI S1.4. Use the "A" scale to measure overall sound level. To determine the specified octave band levels, the above sound levels meter, set on "C" scale, shall be supplemented by an Octave Band Analyzer complying with ANSI S1.11.

4. Determine "equipment components" of room sound (noise) levels for each (of eight) octave bands as follows:

A. Measure room sound pressure level "LP " with equipment to be tested shut off.

B. Measure room sound pressure level "LP " with equipment to be tested turned on.

C. Calculate LP; If this value is less than one, applicable test must be rerun with lower background level (LP) unless LP is within sound pressure level specified for equipment.

D. Determine "C" from table below:

LPt - LPb	(db)	1	2	3	4-4.5	5- 5-1/2	6- 7-1/2	8-12	over 12
	(db)	7	4	3		1.5	1	1/2	0

E. The "equipment component" of room sound level equals LPt-C.

2.07 AIR SYSTEM DATA

1. The certified report shall include for each air handling system the data as indicated in the applicable section of the specifications.

2.08 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.

SECTION 15190 - TESTING AND BALANCING

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).

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.

END OF SECTION
15190.6360F

SECTION 15656 - DUCTLESS SPLIT SYSTEMS

PART 1 GENERAL

1.01 SCOPE

1. Furnish and install all ductless split system air-conditioning system.
2. Leave equipment completely installed so that only the connection of auxiliary services is required to make ready for start up.
3. Provide all materials, miscellaneous equipment and interconnecting piping required for the proper functioning of the work.

1.02 APPROVALS

1. Equipment shall be installed, constructed and rated in accordance with all applicable ARI Standards and bear U.L. label.

1.03 ENERGY EFFICIENCY

1. Units 65,000 BTU/hr or less total cooling capacity shall have SEER2 of 13.4 at standard ratings. Units 65,000 BTU/hr to 135,00 BTU/hr total cooling capacity shall have IEER of 14.8 at standard conditions.

PART 2 PRODUCTS

2.01 OUTDOOR UNITS

1. The unit shall be properly assembled and tested at the factory.
2. Performance - Cooling capacity shall be rated with air entering condenser at 95°F. and a saturated suction temperature at compressor of 40°F. Saturated condensing temperature shall not exceed 117°F.
3. Outdoor coil shall be of nonferrous construction. Coil shall have aluminum plate fins, mechanically bonded to seamless copper tubes. Coil shall be circuited for sub-cooling.
4. Condenser fans and motors - Unit shall be furnished with direct-driven, propeller-type fans arranged for vertical discharge. Condenser fan motors shall have Class B motor insulation, inherent protection, and shall be of the permanently lubricated type, resiliently mounted. Each fan shall have a safety guard. Thru-wall units shall have centrifugal fans, horizontal discharge.
5. Compressors - Each shall be of serviceable hermetic design with external spring isolators and shall have an automatically reversible oil pump. Compressor shall be located in a section separated from condenser fans and coil. Multiple compressor units shall be step-start.
6. Controls shall be factory wired and located in a separate enclosure. Safety devices shall consist of high- and low-pressure switches and compressor overload devices. Unit wiring shall incorporate a positive acting timer to prevent short cycling of compressor if power is interrupted. Timer shall prevent compressor from restarting for a five (5) minute period. Provide reduced current starters where required.

SECTION 15656 - DUCTLESS SPLIT SYSTEMS

7. Casing shall make unit full weatherproof for outdoor installation. Casing shall be of galvanized steel, zinc phosphatized and finished with baked enamel. Openings shall be removable to provide access of servicing. Units shall have as access door on the control panel.
8. Connections - Only refrigerant piping and one (1) power supply connection shall be required for each unit.
9. Arrangement - Unit shall be arranged for pad, wall or roof mounting as noted on drawings.

2.02 REFRIGERANT PIPE

1. Split system units are specifically designated as packaged equipment and as such, the manufacturer shall provide a complete design of the interconnecting piping and controls. As part of the submission of equipment, provide a complete refrigerant pipe design to include all pipe lengths, maximum pipe elevations and distances, as well as all other appurtenances. Equipment manufacturer shall be responsible to provide all refrigerant charge. Equipment manufacturer shall review the location and travel distances of refrigerant pipe and point out where there are problems prior to installation. All modifications to the system design shall be the responsibility of the Contractor.
2. Refrigerant pipe shall be type "K" copper located within finished walls or furred-in or concealed in finished areas. All refrigerant pipe shall be properly supported, insulated and installed in accordance with manufacturers requirements.
3. Furnish complete refrigerant piping packaged pre-charged with fittings thermal expansion valve.
4. Furnish and install at each evaporator or liquid connection an externally equalized thermal expansion valve. Valve shall be capable of being serviced with the body flange in line.
5. Provide at each evaporator liquid solenoid valve with moisture resistant coil, manual operating stem and solder or flanged connectors with maximum one psi or less pressure drop at maximum design loading.
6. Insulate all refrigerant pipe per Section 15180.

2.03 INDOOR UNITS (WALL-MOUNTED)

1. General
 - A. The wall-mounted indoor unit section with a slim silhouette and shall have a modulating linear expansion device. The wall mounted indoor unit shall be used with the outdoor unit. The wall mounted indoor unit shall support individual control.
 - B. Each system shall perform in accordance to the ratings shown on plans. Performance shall be based on nominal cooling conditions of 80°F DB, 67°F WB for the indoor unit and 95°F DB for the outdoor unit.

SECTION 15656 - DUCTLESS SPLIT SYSTEMS

2. Indoor Unit

- A. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

3. Unit Cabinet

- A. The casing shall have a white finish.
- B. Multi directional drain and refrigerant piping offering four directions for refrigerant piping and two directions for draining shall be standard.
- C. There shall be a separate back plate which secures the unit firmly to the wall.

4. Fan

- A. The indoor fan shall be an assembly with one or two line-flow fan(s) direct driven by a single motor.
- B. The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.
- C. A manual adjustable guide vane shall be provided with the ability to change the airflow from side to side (left to right).
- D. A motorized air sweep louver shall provide an automatic change in airflow by directing the air up and down to provide uniform air distribution.
- E. The indoor fan shall provide various speeds.

5. Filter

- A. Return air shall be filtered by means of an easily removable, washable filter.

6. Coil

- A. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
- B. The tubing shall have inner grooves for high efficiency heat exchange.
- C. All tube joints shall be brazed with phos-copper or silver alloy.
- D. The coils shall be pressure tested at the factory.
- E. A condensate pan and drain shall be provided under the coil.

SECTION 15656 - DUCTLESS SPLIT SYSTEMS

F. Both refrigerant lines to the indoor units shall be insulated.

7. Controls

A. Unit shall use controls provided by manufacturer necessary to operate the system and communicate with BMS.

PART 3 EXECUTION

3.01 EQUIPMENT INSTALLATION

1. Provide necessary supporting steel and verify weight and mountings with Structural Engineer.
2. Refrigerant pipe shall be type "K" copper and shall be properly supported and insulated per manufacturers requirements. Maximum length, minimum size supports and insulated in accordance with manufacturers' requirements.

3.02 CONDENSATE REMOVAL

1. Provide trapped condensate pipe sloped to proper reception. Condensate is to be drained to storm or sanitary systems as required by local codes. All pipe to be PVC pipe (except in plenums where type "L" copper shall be used). All pipe to be insulated with 1" thickness fiberglass pipe insulation with ASJ (minimum R = 4.0).

3.03 DDC CONTROL

1. The intent of the design is to provide an open protocol for split system units.
2. The following is a suggested guide for demarcation between equipment and DDC control.
 - A. Items installed by split system unit manufacturer.
 1. Refer to Specification Section 15930, Part 4 for sequence of operation.
 2. Fan motor stop/start
 3. Refrigeration stop/start
 4. Compressor protection via capillary bulb imbedded in the face of the evaporator coil.
 5. Compressor protection controller designed to open the compressor disable circuit based on a coil temperature of 10° (+/-) 5°
 - B. Items supplied, installed, and wired by the contractor and/or DDC sub-contractor:
 1. Zone sensor with set point dial
 2. Zone mounted CO2 sensor
 3. Zone mounted humidity sensor
 4. Exhaust fan interlock
 5. Outdoor Air Humidity Sensor
 6. Controller and all wiring between controller, external points and unit.

END OF SECTION - 15656.6360F

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.
2. Remove existing air handling units and all pipe, duct and appurtenances.

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.
2. Remove and replace existing fans and appurtenances as indicated on plans.

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.

1.05 FACTORY TESTING

1. All factory assembled air handling units 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.**
2. All factory assembled packaged equipment shall be fully quality tested by factor run testing under normal operating conditions. Quality control system shall automatically perform via computer; triple leak check, pressure tests, evacuation and accurately charge system, perform detailed heating and cooling mode tests, and quality cross check all operational and test conditions to pass/fail criteria.
3. Detailed report card will ship with each unit displaying status for critical tests and components.
4. If unit fails on any cross check, it shall not be allowed to ship. Serial numbers will be recorded by factory and furnished to contractor on report card for east of unit warranty status.

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.

SECTION 15810 - AIR HANDLING EQUIPMENT

- 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.
- 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. Propeller fans shall be provided with fan guard, gravity shutter (painted color selected), birdscreen, and adjustable belt motor support base.
- 3. 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

SECTION 15810 - AIR HANDLING EQUIPMENT

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 horsepower 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.

4. 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 VENTILATORS

1. Furnish and 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.

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
15810.6360F

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.
 - C. All breechings and gas vents.
 - D. Removal, modification, expansion and/or connection of existing ducts for new work.
 - E. Removal of existing ducts, flues and all appurtenances as indicated on drawings and as required for execution of design intent of new systems.

1.02 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.

1.03 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 glove cleaning" is complete and dust free.
2. Duct installed and where the duct joints have had sealant, do not cover duct openings until sealant has cured. All work on preventing buildup of the sealant gases shall be done in accordance with sealant manufacturer's requirements and SMACNA.

1.04 FLEXIBLE DUCTS

1. Use corrugated solid metal flexible duct for inlet connection to air control devices such as V.A.V. boxes, etc. Use corrugated aluminum or core polyester core (insulated) for connections on outlet-side of air control devices and low velocity runouts.

SECTION 15860 - DUCT SYSTEMS

2. Ducts must be suitable for the service of acceptable fire rating and shall be insulated as specified for ductwork.
3. Flexible ducts shall be run in the most direct manner and shall be hung so that no bend has a centerline radius less than three times its diameter, maximum 12' +/- . Duct found not in compliance shall be removed and installed to comply with this section at no additional cost.
4. Substitution of flexible ducts for runouts shown as sheet metal or vice versa is acceptable but must be submitted for approval.
5. Flexible duct shall not pass through any wall, draft stopping wall, floor, ceiling or fire resistance rated assembly. Where flexible duct is shown thru these, provide sheet metal collar thru wall and minimum 6" either side.
6. All duct wraps, insulation and appurtenances shall be plenum rated.
7. Flexible duct on inlet to VAV boxes shall have minimum straight run of duct as required and recommended by the VAV box manufacturer.
8. Where flexible ducts are shown to be connected to return air or supply air plenum boxes, the duct connections shall be made to allow for installation of plenum boxes thru ceiling and/or down from roof.

1.05 EXPOSED NON-SPIRAL DUCT

1. All exposed duct not of spiral construction shall not have raised duct joints "Ductmate" or other type of similar joints. All ductwork is to be manufactured and installed with materials, fittings and joints designed to be exposed and unpainted (except where noted on the drawings). Duct to be painted color selected.
2. Only where indicated on the drawings, duct shall be galvanized prepared for painting using duct as indicated below. Galvannealed duct may be used.

1.06 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, or approved equal) 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.
 1. Primer/Topcoat – Sherwin Williams B42W Series or approved equal
 2. Primer/Topcoat – Sherwin Williams B42T1 or approved equal

SECTION 15860 - DUCT SYSTEMS

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.

1.07 BALANCING AND TESTING

1. See Section 15190.

1.08 DIMENSIONS

1. Duct dimensions are **INSIDE CLEAR DIMENSIONS**: Increase metal duct size to allow for thickness of inside insulation.

PART 2 PRODUCTS

2.01 FITTINGS

1. Round elbows shall be formed or stamped type; use five-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 elbow, centerline radius equal to 1.5 times duct width.
 - 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.

SECTION 15860 - DUCT SYSTEMS

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 the Contractor or other contractors work; the work shall be done at the 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 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.
4. Handle and Thumb Trigger – Polyamide 66 (PA66), flame retardant, glass reinforced, "Zytel".
5. Retaining Spring – 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.

SECTION 15860 - DUCT SYSTEMS

8. Bearings

- A. Snap-in bearings for medium and low-pressure systems; flame retardant, glass reinforced, "Zytel" or approved equal.
 - B. B-lined bearings for lined duct. Polyamide 66 (PA66); flame retardant, glass reinforced, "Zytel" or approved equal.
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.

2.04 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.
- 5. The 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, the 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. The Contractor shall notify the architect and/or engineer.

2.05 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.

2.06 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).

2.07 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

SECTION 15860 - DUCT SYSTEMS

penetration. Material shall be 0.081" extruded aluminum. Provide optional welded frame, bird/inset screen, as manufactured by Airlite 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 (or approved equal) painted finish to match brick or Owners' color sample.
3. 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.
4. 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.
5. Where louvers have internal components 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.
6. Screen shall be of adequate size, dimension and configuration to allow for proper air flow and protection of internal components.
7. Provide hinged access for components requiring maintenance.
8. Screen shall be removable. Paint screen and all components color selected.

2.08 FAN DISCHARGE, BACK DRAFT AND RELIEF DAMPERS

1. Air/Dynamic as manufactured "Air Balance" or approved equal.

2.09 DUCT IDENTIFICATION

1. Provide for all concealed insulated and non-insulated duct and duct exposed in non-finished areas; self-adhesive color-coded labels for identification of air flow and equipment.
2. Markers shall be installed at every turn in direction and minimum every 25'.
3. Markers shall have color coding per the manufacturer. In addition to marking, the duct shall have flow directions located next to duct markers.
4. Flow directional tape shall be completely around all visible portions of duct and termination shall be 1' +/- past visible corner. Flow directional tape shall be ASME A13.1 color coding. Color to match duct markers. Arrows shall be white on green, red or blue and black on yellow, green or orange.

SECTION 15860 - DUCT SYSTEMS

5. The duct shall have flow direction located next to flow direction. Indication shall be MS900 flow directional tape; 2" wide for duct up to 12' +/- AFF and 4" wide for duct above 12' +/- AFF.
6. Markers shall have color coding and lettering per the manufacturer and meet ASME A13.1 Standards.
7. Duct markers shall be; duct up to 12' +/- AFF – 2-1/4" x 13" and duct above 12' +/- AFF – 4" x 24".
8. Duct markers shall be MSI MS-900 or approved equal.

PART 3 EXECUTION

3.01 AIR DELIVERY AND NOISE

1. The 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 Specification Section 15010 "Start Up and Adjustments" and 15191 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

SECTION 15860 - DUCT SYSTEMS

approved flexible bumper material, like split Armaflex pipe insulation or approved equal 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.
7. All labels on exposed and concealed duct shall be removed.

3.04 ACOUSTICAL TREATMENT

1. Unless otherwise noted, all duct from all fans and units with fans to 20' from fans shall be acoustically insulated. Ducts to be acoustically insulated shall be insulation in the interior of the duct with 1" thick, 1-1/2# density fiberglass meeting ASTM C1071, coated with acrylic treated EPA registered anti-microbial agent proven to resist microbial growth as determined by ASTM G21 and G22, K value :25 at 75 deg. F., N.R.C. .65 or higher based on type A mounting and listed in accordance to ASTM C-423.
2. Rectangular duct shall be secured using full coverage water based adhesive meeting ASTM C916. Secure insulation with mechanical lines fasteners per SMACNA, NAIUI or manufacturers requirements. All exposed edges of the insulate shall be factory or field coated. Repair liner surfaces with adhesive. Insulate may be installed after duct fabricator at contractors' option. Increase duct size to allow for insulation thickness.
3. Insulation shall be pasted to the metal surface with "3M" EC-890 or approved equal, before duct is made up. On large ducts, stick pins stud-welded or pasted shall be used as additional support. Insulation may be installed after duct is fabricated at Contractor's option.
4. 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. Duct liners shall be interrupted at fire damper and fire doors.
5. Where acoustical insulation is installed, exterior duct wrap is not required unless acoustical insulation does not meet the specifications for duct insulation R Values as indicated in Section 15180.
6. All acoustic insulation shall be plenum rated.

3.05 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.

SECTION 15860 - DUCT SYSTEMS

4. Where re-roofing work requires higher curbs due to new insulation, these shall be used. Coordinate with Contractor for exact location.
5. Gooseneck terminations are not permitted.

3.06 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.

3.07 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 manufacturer's requirements and to avoid any system effects.

END OF SECTION
15860.6360F

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.
2. Removal, addition and/or modification of existing systems as indicated on plans.
3. Removal of existing air devices and replacement with new air devices as indicated on plans.

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 consist 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 removable key.
3. Where grilles are shown, omit the damper.
4. All registers and grilles shall be of aluminum construction with baked white enamel finish.
5. For all registers or exposed duct; Titus Model 5300FL or approved equal.

2.02 DIFFUSERS

1. All ceiling diffusers shall distribute air in a horizontal pattern parallel to the ceiling.
2. All diffusers shall be equipped with opposed blade dampers, operated from diffuser face by an unobtrusive screw operator.
3. All diffusers shall be perforated style METAL*AIR Model 7500-6 AF or approved equal for lay-in ceilings. Face size shall be 24"x24". All diffusers shall be steel construction with aluminum face plates. The finish shall be white baked enamel with black back pan and interiors.
4. Variable Air Volume Square Diffusers (CD-1) - Install, where shown on plans, METAL*AIR Model 5750-6 as Unit-Flow plaque ceiling diffusers or approved equal. The diffuser sizes shall be nominal 24"x24" as scheduled, with minimum 18" square flat appearance panels. The diffusers shall be either aluminized steel or aluminum construction

SECTION 15870 - TEMPERED AIR TERMINAL UNITS

and shall be designed to integrate with the specified ceiling system type (refer to architectural reflected ceiling plan). The diffuser shall consist of a back pan and a removable heavy gauge appearance panel attached to the back pan via four (4) latch tabs. The appearance panel shall have aerodynamic, rigid, hemmed edges around the perimeter and shall be a single piece construction. The panel shall be flat and smooth and shall be free of any welding or forming blemishes. The horizontal air discharge pattern shall be 360-degree type. Baffles shall be provided for directional control as scheduled on shown on the drawings. Diffusers that meet the performance requirements are acceptable. Diffuser finish shall be #01 white. Provide published performance data determined in accordance with the latest ANSI-ASHRAE standard for throw, pressure and sound.

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 of 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
15870.6360F

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

PART ONE – GENERAL

1.01 SCOPE

1. Provide a fully integrated Web Browser Control System incorporating Direct Digital Control (DDC) Technology with energy management, equipment monitoring, and remote communications.
2. The intent of this specification Section is to provide the following features, functionality, and interface services as follows:
 - A. Open Source: The Facility Management Control System (FMCS) shall Open Source, consisting of materials and components available through Open Source product procurement suppliers. Single source exclusivity or other conditions which inhibit the Owner from obtaining both materials and support services from less than three independent procurement avenues of shall not be acceptable.
 - B. Open System platform: The FMCS shall furnish and install a complete JENEsys Niagara N4 Building Management System and an Automatic Temperature Control System including all necessary hardware, all operating and applications software necessary to perform the control sequences as called for within the “Sequence of Operation for HVAC Equipment”, BMS Diagrammatic Details, as shown on the project drawings. The new DDC controllers furnished in this section shall be an Open System platform, all programming of the shall utilize the Open Niagara N4 Platform embedded software package and communicate peer-to-peer via the Open ASHRAE 135 BACnet communications protocol. Provide 2-year post-construction material warranty for all new FMCS controllers and IT hardware.
 - C. Open Niagara Interface Conformance Statements (NICS):
 1. All Niagara 4 software licenses shall have the following NICS:
 - "accept.station.in=*"
 - "accept.station.out=*"
 - "accept.wb.in=*"
 - "accept.wb.out=*"
 2. All NICS shall follow the Open Niagara Interface Conformance specifications.
 3. All JACE hardware licenses and certificates shall be stored on local MicroSD memory card employing encrypted “safe boot” technology.
 4. To ensure quality, any additional JACE hardware products used on this project shall come through the Tridium Richmond, VA shipping facility.
 5. JACE hardware products not meeting these requirements shall not be allowed.
 - D. Peer to Peer Communications
 1. FMCS architecture shall fully support a multi-vendor environment and be able to integrate third party systems via existing vendor protocols including, as a minimum:

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

- BACnet MS/TP
- BACnet IP
- LonTalk
- MODBUS RTU.

E. Web-based Graphical Interface:

1. The Owner shall provide any Thin Client Web Stations (TCWS).
2. The Operator shall be able manage the Building Management System through a connected Thin Client Web Station's web-browser.
3. The FMCS Contractor shall provide 3-dimensional web graphics. Including all floor plans, new mechanical systems, boilers, pumps, fans, unit ventilators, roof top units, coils, etc.
4. Copies of the web graphics shall be retained in the BMS Archival Data Server

F. Local and Remote Connectivity:

1. The FMCS shall provide the Owner with:
 - a. Secure local access shall be through an internal TCP/IP network connection.
 - b. Secure remote access through an Owner provided TCP/IP network connection service.
 - c. Remote connectivity with the offsite monitoring service shall be maintained by the Building Management System.
 - d. Alarm notification to designated stations and personnel through the TCP/IP network connection.

G. Information Technology (IT) compliance and control access.

1. The BMS shall be designed for use with the Owner's current IT level systems for FMCS.
2. BMS TCP/IP devices located in IT rooms shall be fully IT compatible devices that communicate directly on the IT infrastructure in the facility.

3. Embedded Software:

- A. All controllers furnished by the BMS Contractor shall be programmable directly from any Niagara 4 Workbench embedded toolset.
- B. The Owner shall have full licensing and full access rights for all network management, server, engineering and programming software required for the ongoing maintenance and operation of the FMCS and shall receive all Administrator level logins and passwords.

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

- C. The following conditions are not acceptable:
1. Systems that do not fully utilize and conform to the Open Niagara 4 Frameworks platform.
 2. Direct Digital Controllers that require additional software tools for post installation maintenance.
 3. Any additional Graphics Server or software required for Owner interface.
4. New and Existing Systems:
- A. ALL **NEW** FMCS DDC controllers shall as a minimum, match the existing BMS architecture capabilities **AND** shall be installed to the latest Niagara N4 capabilities as required.
 - B. The new FMCS shall incorporate the necessary hardware and software for future integration to existing systems and/or equipment indicated as remaining.
5. FMCS Information Management including:
- System programming
 - DDC Device downloading
 - DDC Device backup
 - FMCS data archiving and retrieval
 - Data Reporting functions.
 - Standard applications for HVAC systems.
 - Diagnostic monitoring and reporting of BMS functions.
 - Offsite monitoring and management access.
 - Energy management
6. The Facility Management Control System (FMCS) shall be comprised of a network of interoperable, stand-alone digital controllers communicating on an open protocol network to the Individual Building Master Network controller. Access to the various Building Management Control Systems shall be locally from any computer or from the existing computer located in the building or remotely from any web access site and shall be accomplished through a Graphical User Interface using Web browser technology via the Internet.
7. The School Districts' Information Technology Department will provide two (2) IP drops for integration into the Information Technology System. The School District Information Technology Department will provide a secure VPN into the network to all for remote monitoring of the system to meet section 1.02 Maintenance Trending Requirement.
8. Provide Connections to all equipment requiring connections to the control medium whether furnished under this Section or not.
9. The system shall use the latest technologies available from the manufacturer in the implementation of Direct Digital Electronic Control for the HVAC system and its management.
10. 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.

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

11. System shall be installed and serviced by technicians that are factory trained in the installation and calibration of the equipment.
12. Provide system in accordance with specifications.
13. The installing Contractor shall be a Certified Installer by the DDC Control Equipment Manufacturer. The Contractor shall include the Certification Documents from the DDC Control Equipment Manufacturer in the Shop Drawing.
14. The installing contractor will be required to provide emergency service personnel on during normal working hours.
15. The installing contractor shall be NJ DPMC pre-qualified under Classification C043 – Control Systems with an aggregate amount equal to or greater than \$15,000,000.00.
16. Contractor shall be responsible for all software, data drops, programming, calibration, the proper operation and adjustment of all controls, dampers and appurtenances to provide required sequence of operations and protection against freeze-ups. Provide system in accordance with specifications.
17. Contractor shall provide all labor, material, equipment and software not specifically referred to herein or on the plans, that are required to meet the functional intent of the 15930 specifications and shall be provided without any additional cost to the Owner. Contractor shall furnish all electrical control and interlock wiring connected to the controls and instrumentation systems. All 110 VAC or greater voltage power wiring to main control panels shall be provided by Contractor, unless indicated otherwise in the Contract Documents.
18. All materials and equipment used shall be standard components, regularly manufactured for this and/or other systems and shall not be custom designed especially for this project. All components shall have been thoroughly tested and proven in actual use.
19. Contractor shall be responsible for installation of all field equipment and the communication transmission bus. Contractor shall supply all necessary electrical power to each controller and provide transformers as required from the electrical power panel source.
20. Contractor shall have project's lead technician attend all commissioning meetings. Contractor shall complete and provide to the CM and Cx all factory startup reports, and pre-functional documentation provided by the Commissioning Agent.
21. The installing contractor shall be certified in network security. Upon award, Contractor shall provide to the Owner a Certified Compliance Statement documenting that the system has been protected against outside network intrusion. It is a requirement of this installation of this FCMS that this system is compliant with the Information Security policies and procedures of this county. Upon completion of this system, a Vulnerability Assessment shall be performed to identify current vulnerabilities and reduce the Information Security Risk for the county, architect and MEP professionals. The awarded contractor shall provide expert advice and consultation to maintain a security posture for the organization. FCMS must be designed with a credentialed Information Security professional. Contractor personnel involved with Vulnerability Assessments and Information Security consulting must possess a current Certified Information Systems Professional (CISSP) Certification and be a member of ISCC2. An ISC2 CISSP Certification is required. These certifications shall be provided upon award of bid; no exceptions.

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

1.02 WARRANTY

1. Provide the following warranties by the installing Automatic Temperature Controls (ATC) manufacturer:
 - A. Warranty on all BAS equipment and installation.
 - B. Warranty on software upgrades.
 - C. Warranty on firmware upgrades.
2. Labor and materials for the control system specified shall be warranted free from defects for a two (2) year period as indicated in "General Conditions". Control system failures during the warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to the Owner. Contractor shall respond to the Owner's request for warranty service with 4 hours during normal business hours.
3. All work shall have a single warranty date. The date of "Substantial Completion" shall start the warranty. Please refer to the AIA A201 Contract Section 9.8 for the definition and requirements of substantial completion.
4. The Owner shall grant to the temperature control subcontractor reasonable access to the FMCS during the warranty period. The Owner shall allow the contractor to access the FMCS through a School District provided VPN from a remote location for the purpose of diagnostics and troubleshooting, via the internet, during the warranty period.

1.03 ACCEPTABLE BAS CONTROL CONTRACTORS:

1. Honeywell Building Technologies
2. A.M.E. Inc. – Fairfield, NJ – Mark McLoud
3. CM3 Building Solutions – Fort Washington, PA

1.04 POST CONSTRUCTION MAINTENANCE SERVICE

1. In addition to warranty periods per the General Conditions, provide maintenance service per Specification Section 15010.
2. The base contract shall include a 2-year service/maintenance term in addition to the 2-year bonded General Contract warranty. The 2-year controls services shall include:
 - A. **Trending:** and logging remotely from the control's provider Remote from the building. A sampling of rooms as agreed by the owner include at least 20% of the rooms shall be trended to confirm proper temperature ranges are maintained.
 - B. **Alarm Monitoring:** The alarm reports shall be monitored remotely, and all alarm issues need to be addressed daily. Contractor shall provide a weekly report that summarizes the alarm issues and the remedy actions taken.

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

- C. The trending shall be summarized in a **weekly email report** to the owner. All rooms outside of the temperature and proper operating ranges shall be highlighted in the report.
- D. The weekly email report shall be discussed in a pre-set time **conference call** that occurs every week.
- E. Once a month, a project specific technician shall **meet onsite** with the Owner to review the weekly reports. The meeting onsite shall be a minimum of 4 hours with onsite verification, tweaking, calibrating and replacing necessary parts and operations as required to maintain the system.
- F. Provide continued **Owner training** over the 2-year term of 24 hours.

1.05 QUALITY ASSURANCE

- 1. All system components shall be fault tolerant and provide satisfactory operation without damage at 110% and 85% of rated voltage and at + 3 hertz variation in line frequency.
- 2. Provide static, transient, and short circuit protection on all inputs and outputs. Communication lines shall be protected against incorrect wiring, static transients and induced magnetic interface. All bus connected devices shall be a.c. coupled or approved equal so that any single device failure will not disrupt or halt bus communication.
- 3. The Manufacturer of the Facility Management Control System shall provide documentation supporting compliance with ISO-9002 (Model for Quality Assurance in Design/Development, Production, Installation and Servicing). The intent of this specification requirement is to assure that the products from the Temperature Control System Manufacturer are delivered through a Quality System and Framework that will assure consistent quality in the products delivered for this project.
- 4. Product literature provided by the Building Management Control System Manufacturer in the submittal package shall contain the ISO-9002 Certification Mark from the applicable registrar.

1.06 TRAINING

- 1. All training shall be by the FMCS manufacturer and shall utilize specified manuals, as-built documentation, and the on-line help utility.
- 2. Operator training shall include two 8-hour sessions of training in addition to the instructions specified in Section 15010.
 - Sequence of Operation review.
 - Sign on-Sign off
 - Selection of all displays and reports.
 - Commanding of points, keyboard and mouse mode.
 - Modifying English text.
 - Use of all dialog boxes and menus.
 - Modifying alarm limits and start-stop times.
 - System initialization.

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

- Download and initialization of remote controllers.
- Purge and/or dump of historical data.
- Troubleshooting of sensors (determining bad sensors).
- Password modification.

1.07 SUBMITTALS

1. Shop drawings and Product Data: Submit under provisions of General Conditions, shop drawings.
2. Product Data: Catalog sheets, specifications, control/wiring, schematic drawings, installation instructions for each item furnished. Include the valve and damper schedules and communications layout of DDC control system.
3. Shop Drawings:
 - A. List of connected data points, including connected control unit and input device.
 - B. System graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.
 - C. System configuration with peripheral devices, batteries, power supplies, diagrams, modems and interconnections.
 - D. Descriptive data and sequence of operation of operating, user and application software including Web Browser software/hardware integrations.
 - E. Flow charts showing the logic sequence for each panel. Provide a non-jargon description for each step in the sequence. In addition, identify which variables are built into the system programming, and which have variable names and can be changed by the operator(s) from the Central Processing Unit.
4. Maintenance Data and Operation Instructions: Upon completion of the work and prior to final acceptance, provide copies of "Systems Operation and Maintenance Manuals" for the installed control systems. Manuals shall consist of copies of all temperature control submittals, including schematic diagrams, panel drawings, components parts, Web Browser Networks, accessories, operation and maintenance instructions, recommended spare parts inventory and complete warranty information.
5. ATC contractor is required to provide a written report stating whether or NOT any equipment furnished by ATC contractor is eligible to receive a Program Incentive payment through the NJ Clean Energy Commercial and Industrial Program (New Jersey SmartStart Buildings®). The report is to be submitted with original shop drawing submittal. Report shall include all supporting equipment specification sheets, applicable AHRI Certificate and any other documentation required. (Note: a negative report MUST be submitted where applicable). Refer to specification 15010 for HVAC Equipment which may qualify for Smart Start Incentive for "Controls".
6. Provide a Maintenance Service Agreement documenting the responsibilities required in Part 1.07 of this specification.

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

1.08 SYSTEM DESCRIPTION

1. This specification defines the minimum equipment and performance requirements for a complete Facility Management Control System for the listed buildings HVAC/Mechanical Systems including terminal equipment.
2. It shall be understood that the drawings and specifications describe the approximate locations of the work. Do not scale the drawings to determine exact positions and clearances.
3. Details of construction and of workmanship where not specifically described herein or indicated on the drawings shall be subject to review by the school. It is the intent of these specifications to provide a complete system, left in good working order, ready for operation, including necessary labor and materials, whether specifically shown on the drawings or mentioned herein.
4. Before submitting proposals, examine the specifications and all drawings relating to the work and become fully informed as to the extent and character of the work and the relation of the work to that of other Sections. Examine the drawings of other Buildings Control Systems to become familiar with all the problems and details of the building construction.
5. Automatic temperature control field monitoring and control system using field programmable microprocessor-based units with web browser communications are the intent of this design.
6. Entire system is to be installed by the System Manufacturer or factory authorized representative.
7. The installation shall comply with local, state, and federal code requirements as applicable.
8. This contract also includes the creation of Systems Graphics at the new FMCS front end computer. The Graphics Programming includes Graphics creation and Dynamic Point editing to reflect all HVAC systems and Hardware System points specified in Part 4.

PART 2 PRODUCTS

2.01 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) 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 per square foot of damper area. Damper hardware shall be zinc plated; bearings shall be nylon, Teflon, oilite or equal.
3. Damper operators shall be mounted outside of duct on device unless factory installed or internally mounted with access panels.
4. Damper operators shall be mounted outside of duct 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.
5. Damper end switches shall sense blade position and not controller output.

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

6. All dampers and damper motors for outside air intakes for all HVAC equipment shall be spring return, quick - acting type.
7. Power wiring 24V or 110V for all dampers shall be provided by the control contractor. Contractor shall verify location of all dampers requiring power and coordinate all other trades for location of power service.
8. Electronic Actuators: Provide actuators with spring return for two-position (24v), 0-5 Vdc, 0-10 Vdc, 2-10Vdc, 4-20 mA, or PWM input (subject to restrictions in Section "BAS Field Panels") as required. Actuators shall travel full stroke in less than 90 seconds. Actuators shall be designed for a minimum of 60,000 full cycles at full torque and be UL 873 listed. Provide stroke indicator. Actuators shall have positive positioning circuit. Where two actuators are required in parallel or in sequence provide an auxiliary actuator driver. Actuators shall have current limiting motor protection. Actuators shall have manual override where indicated.
9. Acceptable Manufacturers:
 - A. Belimo
 - B. Schneider Electric
 - C. Siemens

2.02 Control Valves

1. General: Provide factory fabricated control valves of type, body material and pressure class indicated. Where type or body material is not indicated, provide selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature in piping system. The control valves shall be sized by the controls engineer and shall be guaranteed to meet the heating and cooling loads. Provide valve size in accordance with scheduled or specified 4.0 psi maximum pressure drop across control valve. Control valves shall be equipped with heavy-duty actuators, stainless steel trim, and with proper close-off rating for each individual application. Minimum close-off rating shall be as scheduled and adequate for each application and shall generally be considered at dead head rating of the pump. Control valves used for the primary chilled and hot water systems shall have a minimum close-off rating of 200 psid unless otherwise required or specified. All valves will be Pressure Independent Flow Control Valves. All valves shall be fully modulating unless noted otherwise. Valves shall be sized for quiet operation, equipped with throttling plugs, stainless steel trim, renewable composition discs and be capable of operating at varying rates of speed to correspond with the exact dictates of the controller. Install with stem within 50 degrees of vertical position in horizontal pipe.
2. Plug-Type Globe Pattern for Water Service:
 - A. Valve Sizing: Where not specifically indicated on the control drawings, modulating valves shall be sized for maximum full flow pressure drop between 50% and 100% of the branch circuit it is controlling unless scheduled otherwise. Two-position valves shall be same size as connecting piping.
 - B. Temperature Rating: 25°F minimum, 250°F maximum

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

- C. Body: Bronze, screwed, 250 psi maximum working pressure for 1/2" to 2"; Cast Iron, flanged, 125 psi maximum working pressure for 2-1/2" and larger.
- D. Valve Trim: stainless steel; Stem: Polished stainless steel.
- E. Packing: Spring Loaded Teflon or Synthetic Elastomer U-cups, self-adjusting.
- F. Plug: Stainless steel, Seat: Stainless steel.
- G. Disc: Replaceable Composition or Stainless Steel Filled PTFE.
- H. Ambient Operating Temperature Limits: -10 to 150°F (-12.2 to 66 °C)
- I. All control valves will be Pressure Independent Flow Control Valves
- J. Acceptable Manufacturers:
 - 1. Belimo
 - 2. Flow Control Industries
 - 3. Schneider Electric
 - 4. Siemens
 - 5. Or approved equal

1.03 TEMPERATURE- RH - CO2 SENSORS:

- 1. Room Temperature Sensor: Shall be an element contained within a ventilated cover suitable for wall mounting. Provide standard white low-profile insulated base. Provide setpoint adjustment and occupancy override where indicated. Provide setpoint adjustment and occupant override where indicated on plans. Provide protective guard in public spaces where indicated.
 - Sensor Type: 10K type 3 thermistor.
 - Accuracy: +/- 0.4°F at calibration point.
 - Output range: 32 to 122°F.
- 2. Room Relative Humidity Sensor: Shall be an element contained within a ventilated cover suitable for wall mounting. Provide protective guard in public spaces where indicated.
 - Sensor Type: Thin-film capacitive.
 - Output: 0-100% RH.
 - Accuracy: +/- 2% from 10 to 80% RH.
 - Stability: +/- 1% at 68°F annually for 2 years.
- 3. Room CO2 Sensor: Shall be non-dispersive infrared (NDIR) diffusion sampling type. Provide sensor within a ventilated cover suitable for wall mounting. Provide protective sensor guards in public spaces where indicated.
 - Range: 0 – 2,000 ppm.
 - Accuracy: +/- 30 ppm +/- 2% measured value.
 - Repeatability: +/- 20 ppm +/- 1% measured value

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

4. Single-Point Duct Temperature Sensor: Shall consist of sensing element, junction box for wiring connections and gasket to prevent air leakage or vibration noise. Temperature range as required for resolution indicated for sensor range above. Sensing element shall be platinum RTD, or thermistor, +/- 0.5°F accuracy at calibration point. Acceptable manufacturers:
 - Dwyer Instruments
 - Minco
 - Schneider Electric
 - Siemens
 - Or approved equal
5. Averaging Duct Temperature Sensor: Shall consist of an averaging element, junction box for wiring connections and gasket to prevent air leakage. Provide sensor lengths and quantities to result in one lineal foot of sensing element for each four-square feet of cooling coil/duct face area. Temperature range as required for resolution indicated for sensor range above. Averaging sensors shall be provided for mixed air applications and wherever freeze stats are installed. Sensing element shall be platinum RTD, or thermistor, +/- 0.5°F accuracy at calibration point. Acceptable manufacturers:
 - Dwyer Instruments
 - Minco
 - Schneider Electric
 - Siemens
 - Or approved equal
6. Duct / OA CO2 Sensor: Shall be non-dispersive infrared (NDIR) diffusion sampling type.
 - Range: 0 – 2,000 ppm.
 - Accuracy: +/- 40 ppm +/- 3% measured value.
 - Response: 2 min for 99% step change
 - Repeatability: +/- 20 ppm +/- 1% measured value
 - Acceptable manufacturer's: Dwyer, Vaisala, Schneider Electric, Siemens or approved equal.
7. Duct RH Sensor:
 - Range: 0 - 100% RH.
 - Accuracy: +/- 2% (20 to 95% RH).
 - Repeatability: Less than +/- 0.5%
 - Acceptable manufacturer's: Dwyer, Schneider Electric, Vaisala, Veris or approved equal.
8. Liquid immersion temperature sensor shall include brass thermowell, sensor and connection head for wiring connections. Temperature range shall be as required for resolution of 0.15°F. Sensing element shall be platinum RTD or thermistor; +/- 0.5°F accuracy at calibration point. Temperature range shall be as required for resolution of 0.15°F. Acceptable manufacturer's:
 - Dwyer Instruments
 - Minco
 - Schneider Electric
 - Veris Industries
 - Or approved equal

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

9. Pipe Surface-Mount Temperature Sensor: Shall include metal junction box and clamps and shall be suitable for sensing pipe surface temperature and installation under insulation. Provide thermally conductive paste at pipe contact point. Temperature range shall be as require for resolution indicated in paragraph. Sensing element shall be platinum RTD, thermistor, or integrated circuit, +/- 0.5°F accuracy at calibration point.
10. Outside air temperature sensors shall consist of a sensor, sun shield, utility box, and watertight gasket to prevent water seepage. Sensing element shall be platinum RTD, +/- 0.5°F accuracy at calibration point. Acceptable Manufacturers:
 - Minco
 - Vaisala
 - Veris Industries
 - Or approved equal

2.04 FACILITY MANAGEMENT CONTROL SYSTEM

The Facility Management Control System (FMCS) shall be comprised of a network of interoperable, stand-alone digital controllers. The Facility Management Control System shall be comprised of BACnet Ethernet I/P (or BACnet MS/TP in limited locations which may be necessary for integration to mechanical equipment or existing systems). The FMCS shall conform to the following:

1. Controllers shall be dual port BACnet IP with Rapid Spanning Tree (RSTP) communications protocol. The system shall have the capability to identify failure of a single controller without loss of communication to remaining on-line controllers.
2. The system must provide an onsite data collection and storage mechanism to collect and store a BACnet trend log for all points on site including terminal equipment.
 - A. It must be capable of initiating a secure connection to an offsite storage location and must become part of the building's DDC system.
 - B. Management of the onsite system must be available through a local Ethernet connection that provides management of the physical device and its behavior through a local, built-in web server. This web server must allow for configuration, management and monitoring of the device.
 - C. The device(s) must be able to auto-discover all BACnet devices that are connected to it.
 - D. It must identify all trend logs, controller databases and objects.

2.05 BUILDING CONTROLLERS:

1. The Building Niagara Tridium Controller shall provide the interface between the Building Controller and the field control devices and provide global supervisory control functions over the Mechanical Equipment Controllers, Terminal Equipment Controllers and control devices connected directly to the Building Controller. Controller shall be capable of executing application control programs to provide:
 - Calendar functions
 - Scheduling

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

- Trending and Trending Backfill
- Alarm monitoring and routing
- Time synchronization
- Integration of BACnet® devices and BACnet® controller data
- Integration of MODBUS devices and MODBUS controller data.

2.06 MECHANICAL EQUIPMENT CONTROLLERS:

1. Mechanical Equipment Controllers shall provide high-performance Direct Digital Supervisory Control for all Rooftop AC and Air Handling Units. Communications interface with the Building Controller shall be high speed BACnet Ethernet IP RSTP protocol. The ATC contractor shall be responsible for I/O and safety interface to the mechanical equipment as necessary to meet the specified sequence of operation.

2.07 TERMINAL EQUIPMENT CONTROLLERS:

1. Terminal Equipment Controllers shall provide high-performance Direct Digital Supervisory Control for all VAV Boxes, Fan Coil Units, Unit Ventilators, Duct Heaters and Exhaust Fans. Terminal Equipment controllers shall be provided with dual port BACnet IP RSTP protocol.

2.08 LAN NETWORK HUBS AND MANAGED SWITCHES:

1. Provide managed switches with support for RSTP (Rapid Spanning Tree) protocol.
2. BAS network shall be configured to prevent LAN communications loss in the event of a single controller failure.
3. The RSTP network shall be restricted to BAS controllers with no other third-party devices or switches installed on the network.
4. The BAS shall provide indication of network activity, speed and status.
5. Provide rack mounting hardware and enclosures where necessary.
6. Required 120 Vac power provided by BAS contractor under this section.
7. Approved manufacturers: Cisco – no exceptions.

2.09 PROTECTIVE FREEZESTATS, FIRESTATS AND SMOKE DETECTORS

1. Provide all new air handling systems to include rooftop units, air handlers and unit ventilators shall have freezestat located on the inlet side of hydronic coils. When its setting is exceeded, perform the following:
 - A. Open control valve on heating coil to full heating and/or close outside air damper and stop fans.
 - B. All protective devices shall be manually reset and shall send an alarm signal to DDC system.

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

2. Smoke detectors in system greater than 2,000 cfm shall have smoke detector installed in return downstream of filters.
3. Smoke detector well, interlock, control wiring and all appurtenances shall be by Contractor.
4. Upon activation, the smoke detectors shall shut down the air distribution system.
5. Smoke detectors shall be supplied by electrical contractor and wired to fire alarm panel by electrical contractor. Smoke detectors shall be installed by HVAC contractor.
6. The electrical contractor shall verify smoke detector auxiliary contacts.
7. The interlocking of smoke detectors with HVAC equipment shall be by Contractor.
8. Interface existing smoke detectors.

2.10 ROOM SENSORS

1. Room sensors shall be electronic. Sensors shall be adjustable from rooms with limitations able to be set by DDC system. All sensors in non-supervised areas (toilet rooms, cafeteria, gym, corridors and similar areas) shall have lockable metal covers. For sensors on exterior walls, provide insulation (minimum 2" thick R=8.0). Provide with push button occupied/unoccupied override.
 - A. Wall Mounted Combination Sensors (Demand Control Ventilation System Only) - provide wall mounted combination sensors which shall contain a space temperature sensor and CO₂ sensors in a single, decorative housing. The CO₂ 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.- 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)
 - CO₂ Sampling Method: Diffusion
 - CO₂ Sensor Output: 4 to 20 mA or 0 to 10-volt signal
 - Sensitivity: ±20 ppm
 - Accuracy: ±100 ppm to 60°F.- 90°F. (15°C. to 32°C.) and 760 mmHg
 - CO₂ Sensor Calibration: Single point calibration via push button and LED
 - Space Temperature Sensor: 10K ohm ±2% at 77°F. (25°C.) thermistor
 - B. Combination sensors shall be provided with the manufacturers' recommended carbon dioxide calibration kit. The quantity shall be suitable to initially calibrate each sensor provided for the project.

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

PART 3 EXECUTION

3.01 ELECTRIC WIRING

1. All power and control wiring in connection with the temperature control system shall be furnished and installed under this contract and shall be per applicable NEC.
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 (refer to section 16000 for acceptable wiring methods).
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 or approved equal 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 by the DDC contractor/manufacturer 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 unless otherwise specified.
 - E. Wiring of flow switches, sequence relays, thermostats and permissive circuits to boilers.
7. Metal raceways shall be installed where pipe cannot be installed in construction and 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. Except for motor feeders and for existing wiring between motors, motor controllers, feeder panels, fuses, circuits breakers and buss bars. All of the new electrical work required for the facility management control system including but not limited to time switches, damper motors, damper switches, electric thermostats, electric relays, interlocking wiring, wire, conduit, etc.; shall be provided and installed by the FMCS Contractor. It shall be the FMCS Contractor's responsibility to provide all wiring required to achieve the functions called for in these specifications.
10. All exposed wiring shall be in EMT or rigid conduit.
11. Control wiring in plenums shall be furnished and installed in EMT or conduit or an approved shielded cable for plenum use above accessible ceiling spaces.

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

12. DDC contractor shall provide all wiring. Where union jurisdiction (110V and above) prohibits installation by Contractor, the contractor shall provide the services of a licensed electrical contractor. Contractor may be same contractor as on job, or a different electrical contractor. All costs for providing this work shall be the mechanical contractors' responsibility.

3.02 INSTALLATION OF DAMPER MOTORS

1. 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.

3.03 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 Contractor at no additional expense to Owner, regardless of the trades involved.
3. Where devices are behind general construction, provide access doors.

3.04 ATC PANELS

1. The location and quantity of ATC panels are to be determined and verified in field. Panels to have emergency power electrical connections. The final location and quantity of panels are to be verified with Owner. Contractor shall be responsible for providing all power wiring and to coordinate all power wiring requirements as to location, quantity, and wire size with electrical contractor. Extension of services, new power wiring for new panels, and all modifications to existing 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 Contractor. The back-up shall be for a minimum of 3 hours and shall allow for an orderly shutdown. The resetting, rescheduling, and/or reprogramming of the controls will not be allowed based upon failure to meet the intent of this specification.
3. No unit controllers or ATC panels shall be located above the ceiling.

3.05 ACCEPTANCE TESTING

1. Upon completion of the installation, the Contractor shall load all system software and start-up the system. Contractor shall perform all necessary calibration, testing and de-bugging and perform all required operational checks to ensure that the system is functioning in full accordance with these specifications.

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

2. Contractor shall perform tests to verify proper performance of components, routines, and points. Repeat tests until proper performance results. This testing shall include a point-by-point log to validate 100% of the input and output points of the DDC system operation.
3. Upon completion of the performance tests described above, repeat these tests, point by point as described in the validation log above in the presence of Owner's representative, as required. Properly schedule these tests so testing is complete at a time directed by the Owner's Representative. Do not delay tests so as to prevent delay of occupancy permits or building occupancy.
4. System Acceptance: Satisfactory completion is when Contractor has performed successfully all the required testing to show performance compliance with the requirements of the Contract Documents to the satisfaction of the Owner's representative. System acceptance shall be contingent upon completion and review of all corrected deficiencies.
5. Commissioning: Contractor shall complete and provide to the CM and Cx all factory start-up reports and pre-functional documentation. Contractor shall have the project lead technician attend all Cx meetings. Contractor shall coordinate with and support the Owners' testing and balancing contractor.

PART 4 HARDWARE POINTS

4.01 GENERAL

1. The Facility Management and Control System (FMCS) shall be designed, installed, and commissioned in a turnkey fully implemented and operational manner, including all installation labor and programming.

4.02 HARDWARE POINTS LIST - I/O Points by the FMCS Contractor

1. Exhaust, Supply & Transfer Fans
 - Fan Start/Stop
 - Supply Fan Status - Current Switch
 - Automatic Damper Operation (where applicable)
 - Room Temperature Setting (where applicable for ventilation)
2. Ductless Split Systems
 - A. Operating/Setting
 - Request all Off (Emergency Stop)
 - Request On/Off
 - Setpoint
 - Request Fan Speed
 - Request Local Prohibit On/Off
 - Request Local Prohibit Setpoint
 - Request Forced Thermostat Off
 - Filter Sign Request
 - Time Stamp

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

- Request Limit Temperature Setting Range
- Request Simplified Locking

PART 5A SEQUENCE – GENERAL

SPACE SETPOINTS

	SPACE SETPOINT
Occupied Heating	68°F.
Morning Warm-up	68°F.
Unoccupied Heating	60°F.
Occupied Cooling	74°F.
Cool-down	74°F.
Unoccupied Cooling	80°F.
Relative Humidity	55% RH

Note: All setpoints to be adjustable by Owner via FMCS.

OCCUPIED/UNOCCUPIED PERIODS

The purpose of this schedule is to establish a baseline for equipment operation and sequencing. This is to allow system to provide optimum effectiveness and increase efficiency. The hours of operation shall be reviewed with the school prior to occupancy. The contractor shall provide as part of their training, instructions to Owner for changing and adjusting sequences and times of operation. The hours of operation shall also be able to be adjusted for individual equipment and/or zones (ie. Gymnasium, Auditorium).

Occupied Heating 6AM

Optimal start-up with adjustment based on system requirements.

Occupied Heating (Outside Air)

Operation of outside air system (damper open, heat recovery outside air) delayed approximately one hour after occupancy (adj.) and one hour prior to end of school (adj.).

Unoccupied Heating 3PM

Schedule for after school usage shall adjust this period.

Occupied Cooling 7AM

Optimal smart start-up with adjustment based on system requirements.

Occupied Cooling (Outside Air)

Operation of outside air system (damper open, heat recovery outside air) delayed approximately one hour after occupancy (adj.) and one hour prior to end of school (adj.).

In addition, where CO2 sensor below operational setpoint and outside relative humidity is higher, adjust damper opening time to allow for delayed opening.

SECTION 15930 - FACILITY MANAGEMENT CONTROL SYSTEM

Unoccupied Cooling 3PM

Schedule for after school usage shall adjust this period.

PART 5B – SEQUENCE OF OPERATIONS

5.01 FANS

1. Gang Toilet Room Exhaust Fans - Interlock with respective zone controls and/or units, run continuously during occupied, de-energized during unoccupied warm-up and cool-down modes.
2. Single Toilet Rooms Exhaust Fans - Ceiling exhaust to operate with light switch. (Note- Contractor to provide all interlocking controls and control wiring).
3. Team Room Exhaust Fan – Interlock fan with light switch and 0-4 hr. timer switch.

5.02 HVAC SYSTEM EMERGENCY SHUT-DOWN SWITCH'S

1. Upon manual operation of single switch, shut down all HVAC equipment that uses outside air for ventilation, combustion air or any other purpose which may cause outside air to enter building by equipment use.
2. Switch shall be for all equipment.
3. Switch shall be a manual switch labeled and lockable and shall be located per Owners' direction.
4. Switch shall also send signal for quick closing outside air dampers to close.
5. Provide clear plastic liftable cover and a 12" x 4" engraved sign; "Emergency HVAC Shut Down."

5.03 FIELDHOUSE TOILET ROOM

1. The design is based on the fieldhouse being deenergized and drained for the winter. The sequence is for periods of draining system that is subject to lower temperatures.
2. Provide exhaust for when indexed to be energized, the outside air louver shall be open.
3. Provide space to limit the thermostat that shall be set for 40°F. +/- (adj.) during unoccupied periods (no exhaust fan). Thermostat shall activate heaters.
4. During periods when space is occupied, Owner shall have the ability to run system.
 - A. Option 1 – Heaters energized in a fall below setpoint and exhaust fans cycled, the amount of the time for cycle shall be field determined.
 - B. Option 2 – Heaters energize fans operating 100%.
5. Provide space low limit which shall be set to 32°F., deenergize fans, energize electric heat and send alarm condition.

END OF SECTION-15930.6360F

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.
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. The 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, the contractor shall inform engineer prior to installation. Any construction installed by the contractor that is not in compliance with applicable codes, shall be removed, modified, and/or replaced at no additional cost.
3. All equipment shall be labeled by an approved agency.
4. The 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 Specification Section 01300-Submittals and the AIA Document A201-2017 General Conditions of the Contract for Construction.

1.05 WORKMANSHIP

1. See Specification Section AIA Document A201-2017 General Conditions of the Contract for Construction.

1.06 SHOP DRAWINGS

1. See Specification Section 01300 – Submittals.

1.07 AS-BUILT DRAWINGS

1. See Specification Section 01700 – Project Closeout

1.08 WARRANTY

1. See Specification Section 01740 – Warranties and Bonds.

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. The 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 the Contractor shall have such services provided.
2. The Contractor shall verify exact requirements with shop drawings.
3. The 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 2018 IBC New Jersey edition. Proseal Systems - Proseal plug device or approved equal per 93 UL Directory, No 545, F rating for precast concrete. 3M Brand Fire Barrier CP25WB or approved equal and caulk CAJ 1044 and CAJ 5001, WL1003, WL5011, or approved equal.

PART 2 PRODUCTS

2.01 ELECTRICAL EQUIPMENT

1. The 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 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. The 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. The Contractor shall verify all electrical characteristics of all equipment with electrical contractor. The Contractor shall submit to electrical contractor location of all motor, starters, other electrical equipment voltage and phase required prior to submission of the Contractors' and electrical contractors' shop drawings.

SECTION 15015 – GENERAL REQUIREMENTS

8. Should the Contractor change type of equipment which results in change to electrical characteristics, then the Contractor will be responsible to coordinate these changes with all other trades and pay for all required changes.
9. Should the 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. The 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. The 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. The 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. The 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. The 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 the 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, the 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 the adaptability of new systems to existing structures.

3.03 CLEANING

1. Upon completion of the work, the 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 ensure 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. The 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. The 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. The Contractor's personnel shall remain until such instruction is complete to Owner's satisfaction. The 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 from 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 layout 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. The 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 the 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. The 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 the existing building.
7. All interruptions of service shall be done at times which cause least disruption of service.

3.15 PROTECTION OF SERVICES DURING CONSTRUCTION AND DEMOLITION

1. The 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. The 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.

SECTION 15015 – GENERAL REQUIREMENTS

4. The 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 the Contractor to protect existing and new motors, pumps, electrical equipment, plumbing fixtures and all phases of construction.

3.16 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 the Contractor.

<u>M A N U F A C T U R E R</u>				
<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
Electric Water Cooler	Halsey Taylor	Haws	Sunroc	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
Hot Water Heater	Bradford			Or approved equal

3.17 UNIT PRICES (See General Conditions)

1. See "General Conditions".

3.18 ALTERNATE BID

1. See "General Conditions". Refer to drawings and specifications for extent of work.

3.19 REMOVAL

1. The 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. The Contractor shall then load, transport and unload equipment from building to site designated by Owner within a 20-mile radius of project.

SECTION 15015 – GENERAL REQUIREMENTS

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. The 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. The Contractor shall visit site to determine extent of work and all conditions.

3.20 BUILDING ALTERATION WORK

1. The 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. The 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.
5. The Contractor shall either retain qualified independent contractors or utilize the other on-site contractors. The Contractor shall assume all requirements for any conflicts with union policy and be responsible for same. The 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.

3.21 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

SECTION 15015 – GENERAL REQUIREMENTS

so as 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, the 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
15015.6360F

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 the 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. The 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. The 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 the 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 the 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.

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 apparatuses 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 the 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. The 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 one 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. A.S.A. A21.10 or AWWA Class 250 cast iron fittings shall be used on cast iron water pipe and A.S.A.11 Class 250 mechanical joint pipe. All piping shall be properly blocked. Use lined fittings in lined pipe.
8. Fittings for polyvinyl chloride (PVC) shall be socket fittings or solvent welded.

SECTION 15115 - BASIC MATERIALS AND METHODS

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.

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". Valves used for balancing shall have infinite throttling handle and adjustable stops. All valves bubble tight shut-off.

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.

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.
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.

SECTION 15115 - BASIC MATERIALS AND METHODS

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 (or approved equal) 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. The Contractor shall do all excavating and backfilling necessary and repair finished surfaces that are disturbed. The 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. The 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.
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. The 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

SECTION 15115 - BASIC MATERIALS AND METHODS

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. The Contractor shall determine their necessity by investigating conditions at the site.
2. The 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 1/2", 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. The 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 – INITIAL CLEANING

1. Prior to the start of construction and/or renovation work, the Contractor shall provide a hydro-jet cleaning and a video inspection of all existing sanitary for new toilet rooms from proposed point of connection to where sanitary line exits school.
2. The Contractor is responsible for all work and all cost of work. The Contractor shall utilize a certified independent sub-contractor using the latest technology to perform the hydro-jet cleaning and video inspection.

SECTION 15115 - BASIC MATERIALS AND METHODS

3. Work shall be done so that any debris and blockages encountered shall be removed. Take proper precautions (i.e., screening, etc.) to prevent the debris and material from entering the municipal sewer system.
4. Any blockages encountered which cannot be removed by hydro-jet cleaning shall be the responsibility of the Contractor to remove.
5. Any leaks encountered shall be reported to the Owner.
6. At the completion, provide video with a written test report to the Owner.

3.04 CLEANING OF GRAVITY SYSTEMS – FINAL CLEANING

1. At completion of project, prior to owner occupancy, the Contractor shall provide a hydro-jet cleaning and a video inspection of the newly installed gravity sanitary. The scope of work is all existing, and new gravity systems installed in building and as indicated in Section 3.03 for initial cleaning.
2. The Contractor is responsible for all work and all cost of work. The 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 caution (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 the 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 the 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.

3.05 DRAINAGE PIPING

1. All vent piping may not be shown. The 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.

SECTION 15115 - BASIC MATERIALS AND METHODS

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.
11. Where pipe is installed in previously compacted fill, the Contractor shall be responsible, at no additional cost to Owner, to backfill and compact soil to within tolerances provided by Architect.

3.06 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. 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.

3.07 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 temporarily supported or secured to ferrous metals.

3.08 FOUNDATIONS

1. Foundations shall be provided by the 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.

SECTION 15115 - BASIC MATERIALS AND METHODS

4. All foundations shall be built to templates and reinforced as required by the load to be imposed upon them.

3.09 STRUCTURAL STEEL

1. The 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.

3.10 ERECTION AND RIGGING

1. The 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.

END OF SECTION
15115.6360F

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.

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. On outdoor installations, double insulation thickness and provide metal jacket banded or with sheet metal screws.
4. 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.
5. All insulation shall be "plenum rated".

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. 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.**

SECTION 15185 - 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 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 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. The 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 or approved equal, furnished with all controls, power wiring and appurtenances. Size and capacity per manufacturers' requirements.

END OF SECTION
15185.6360F

SECTION 15260 - WELL WATER SYSTEM

PART 1 GENERAL

1.01 SCOPE

1. The work under this heading shall include the furnishing and installation (where required) of:
 - A. All materials and specialties required for the proper functioning of the work.
 - B. All pipe and appurtenances to connect to existing well system.

1.02 CODES AND REGULATIONS

1. All work done, all equipment and material used and all tests shall be done to meet the approval of any local authorities having jurisdiction.

1.03 NEW CONNECTION TO EXISTING WELL SYSTEM

1. The existing well system consists of three (3) wells; (1) serving the Middle School and (2) serving the High School. The well system serving the High School is a backup well. This well is controlled by the existing school utilizing the existing pressure sensor and variable speed drive.
2. The new work by site contractor consists of a new connection to the well system. The existing well shall be controlled from the existing control, therefore there will always be flow available.
3. The new Fieldhouse domestic water system shall extend 5' outside of the building. All pipe 5' outside of building to existing well and connection to well system shall be per site contractor.

1.04 WELL WATER TREATMENT (FURNISHED BY OWNER)

1. Contractor shall coordinate and make all connections to well water treatment system being furnished by Owner.

PART 2 PRODUCTS

2.01 PNEUMATIC TANK

1. Amtrol "Well-Xtrol" or approved equal, sealed diaphragm type pneumatic tank - ASME labeled with five (5) year guarantee.

2.02 PIPE

1. All pipe 5' outside of the Fieldhouse to connection to the existing well system, see site contractors' drawings.
2. Provide capped system at 5'-0" outside of the building. Final location per site engineer.

END OF SECTION
15260.6360F

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 STORAGE WATER HEATER

1. Furnish and install domestic hot water heaters as shown on plans. Heaters shall have pressure temperature relief valved piped to receptor. Insulate in accordance with ASHRAE-90 requirements.
2. Fuel fired units shall have breeching and flues as required and as specified in Section 15860.
3. Provide emergency shutoff switches with all wiring per code.
4. Provide combustion air and interlock with combustion air to allow for operation of combustion air only during periods of use.
5. For units installed above or elevated above fixtures, provide support, emergency drain pan and vacuum breakers.

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.

SECTION 15410 - WATER SUPPLY SYSTEMS (INTERIOR)

4. Minimum tank volume shall be .11 gallons expansion tank per gallon of storage tank capacity. Volumes based on 140°F. water temperature, for higher temperatures adjust volumes accordingly.

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 MINIMUM COVER FOR EXTERIOR LINES

1. Water Lines - three feet six inches (3'6").

3.04 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, the Contractor shall coordinate location and sizes required. The 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 the 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.

3.05 NEW DOMESTIC WATER PIPE DRAINING FOR FIELDHOUSE

1. The domestic water pipe for the Fieldhouse shall utilize the existing well system. The new domestic water shall connect to the existing well system. Provide new shutoff valve.
2. The new pipe shall extend to Fieldhouse (see site plan) and have provisions for draining system.
3. Domestic water to Fieldhouse shall extend to 5' outside of building. All pipe in Fieldhouse shall be drained to low pans and have provisions for cleaning system.

END OF SECTION

15410.6360F

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 for underground and above sanitary.
2. All sanitary pipe below floor shall be Schedule 40 PVC.
3. All vent pipe above grade shall be cast iron.

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 with sheet lead (6 lbs./Sq.Ft.). Extend lead vertically up pipe and turn down into bore 2" or terminate in special flashing collar. See Section titled "General Requirements - Flashings".

END OF SECTION-15420.6360F

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 approved 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.

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.

SECTION 15450 - PLUMBING FIXTURES AND EQUIPMENT

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-ASL-1 or approved equal. Lav Shied 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 **P-7** - MOP SERVICE BASINS

1. Fiat molded stone mop service basin with #830-A supply fitting and #889CC mop hanger (or approved equal).

2.08 **P-8** - ELECTRIC WATER COOLERS

1. Elkay Model LZ8WSSSMC (or approved equal), stainless steel, service mounted and refrigerated filtered bottle filling station.

2.09 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 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.
5. Provide deep seal traps and JR Smith Quad Seal.

SECTION 15450 - PLUMBING FIXTURES AND EQUIPMENT

2.10 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. Field House Fixtures - 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. Field House Fixtures - Carriers for water closet shall be Josam Series with special duty high 750# carrier.

2.11 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.

2.12 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 1/2" dia. cold water to safewaste.

2.13 WALL HYDRANT

1. Provide Watts Model HY-725 (or approved equal), non-freeze, concealed, key operated with integral vacuum breaker.

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-15450.6360F

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 lighting
- E. Utilization equipment connections
- F. Fire alarm systems
- 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.

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 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.

SECTION 16100 - GENERAL ELECTRICAL

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.

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

SECTION 16100 - GENERAL ELECTRICAL

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.
 - 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.

SECTION 16100 - GENERAL ELECTRICAL

- 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 associated 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 accordingly.

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

SECTION 16100 - GENERAL ELECTRICAL

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.

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

SECTION 16100 - GENERAL ELECTRICAL

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.

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.

SECTION 16100 - GENERAL ELECTRICAL

- 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 by the electrical contractor and equipment furnished and installed by others and wired by the electrical contractor.
 - A. 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

SECTION 16100 - GENERAL ELECTRICAL

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 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.
- 14.6 Where any abnormal, questionable, "failing", or "borderline" test results are encountered or where discrepancies are noted during testing, submit results immediately to the engineer 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.

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 substitution will be denied.
- 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

SECTION 16100 - GENERAL ELECTRICAL

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.
- 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 panels, transformers, 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. Submit detailed computer-generated illumination foot-candle calculations for luminaires where requested by the architect, owner, 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 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

SECTION 16100 - GENERAL ELECTRICAL

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.

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 request, except where the sample is for a substitution. Where sample is for a substitution, submit samples within seven (7) days of request.

SECTION 16100 - GENERAL ELECTRICAL

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.
- 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 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.

SECTION 16100 - GENERAL ELECTRICAL

- 18.5 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, lighting controllers, 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 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:
- 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. Scope of work changes, w/ breakdowns (see 16100-11)
 - B. Test results, abnormal/failing only (16100-15)
- 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

SECTION 16100 - GENERAL ELECTRICAL

- 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.
- 20.5 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 week ends, 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 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.

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/coordinating 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

SECTION 16200 - ELECTRICAL WORK PRACTICES

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.
- 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

SECTION 16200 - ELECTRICAL WORK PRACTICES

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 m² (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.
- 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.
- 3.8 Detail all grounding on as-built record documents.
- 4. WIRING METHODS
 - 4.1 The wiring methods in this section apply to all systems, unless specifically indicated otherwise.

SECTION 16200 - ELECTRICAL WORK PRACTICES

- 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. 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 (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 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

SECTION 16200 - ELECTRICAL WORK PRACTICES

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. 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, 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 "MC" cables are not permitted in wet, damp, or exterior locations. Type "MC" cables are not permitted in exposed visible locations. 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).
- 4.10 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.
- 4.11 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.
- 4.12 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.

SECTION 16200 - ELECTRICAL WORK PRACTICES

- 4.13 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.
- 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.
- 4.14 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.
- 4.15 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.

SECTION 16200 - ELECTRICAL WORK PRACTICES

- 4.16 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.
- 4.17 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 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.
- 4.18 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

SECTION 16200 - ELECTRICAL WORK PRACTICES

#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 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 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.

SECTION 16200 - ELECTRICAL WORK PRACTICES

- 5.12 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.
- 5.13 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.
- 5.14 Space raceways embedded in concrete slabs, walls, beams, etc. or run underground not closer than 76 mm (3") between outsides of raceways and install to avoid changing locations of reinforcement. 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 embedded.
- 5.15 Embedded raceways are not permitted to cross, except where the 76 mm (3") spacing and one-third thickness provisions above are maintained or exceeded.
- 5.16 In building exterior walls and roofs, do not install any wiring, other than that merely passing through, in veneer cavity or other interstitial spaces of the building envelope.
- 5.17 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.
- 5.18 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.
- 5.19 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 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.

SECTION 16200 - ELECTRICAL WORK PRACTICES

- 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 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

SECTION 16200 - ELECTRICAL WORK PRACTICES

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 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 (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

SECTION 16200 - ELECTRICAL WORK PRACTICES

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.
- 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.

SECTION 16200 - ELECTRICAL WORK PRACTICES

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.
- 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
Devices with fuses/breakers **	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
Controllers & grouped controls	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top
<u>Fire Alarm Equipment</u>			
Fire alarm controls	15" (0.38m) to 48" (1.22m)	None	78" (1.98m) to top

SECTION 16200 - ELECTRICAL WORK PRACTICES

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.

All equipment mounted above counters ***** 15" (0.38m) to bot. 44" (1.17m) to top

Other Equipment

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.
- ***** 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 Reference single line diagram for description of the proposed electrical system.

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).

SECTION 16200 - ELECTRICAL WORK PRACTICES

- 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.
- 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),

SECTION 16200 - ELECTRICAL WORK PRACTICES

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. EXCAVATION, BACK-FILLING, AND RESTORATION

- 14.1 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.
- 14.2 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. Provide foil-backed detectable plastic warning tape installed 205 mm (8") below finished grade above the top of underground wiring and underground conduit duct banks (minimum 155 mm (6") wide and with color coding and wording according to the use of the wiring; Thomas & Betts #NAF-0700 series or equivalent).
- 14.3 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).
- 14.4 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

SECTION 16200 - ELECTRICAL WORK PRACTICES

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. 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.

- 14.5 Completely remove and properly dispose of any material excavated and not utilized for backfill, include all costs in bid.

15. HOUSEKEEPING AND EQUIPMENT PADS

- 15.1 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.
- 15.2 Provide all floor/roof mounted equipment on 100 mm (4") concrete housekeeping pad.
- 15.3 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).

SECTION 16200 - ELECTRICAL WORK PRACTICES

- 15.4 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, 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.

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.

SECTION 16300 - ELECTRICAL MATERIALS

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 without integral wiring devices: Provide steel type. Utilize Wiremold types #V700, #V2000, #V2100, or #V2400 (or approved equal) sized 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.

SECTION 16300 - ELECTRICAL MATERIALS

- B. 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.
- C. Nonmetallic surface raceways are not permitted, unless specifically indicated otherwise on the drawings.
- D. 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.
- E. 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".
- F. 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.
- G. 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.
- H. 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.
- 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.

SECTION 16300 - ELECTRICAL MATERIALS

- 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 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.
 - 3.7 100 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).
 - 3.8 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.
 - 3.9 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 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).

SECTION 16300 - ELECTRICAL MATERIALS

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 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.

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 the floor is in direct contact with earth, i.e. basement slabs, slabs on grade, etc.), or where

SECTION 16300 - ELECTRICAL MATERIALS

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 Insulation piercing type splices, taps, and connections of any kind are not permitted under any circumstance (including where applied after removing insulation).
- 6.4 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.
- 6.5 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

SECTION 16300 - ELECTRICAL MATERIALS

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.

- 6.6 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 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.
- 6.7 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.

SECTION 16300 - ELECTRICAL MATERIALS

- 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.
- 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.

SECTION 16300 - ELECTRICAL MATERIALS

- 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 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):	PP1
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. 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

SECTION 16300 - ELECTRICAL MATERIALS

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.

- C. 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).

- 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 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 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

SECTION 16300 - ELECTRICAL MATERIALS

"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.

- 8.12 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.
- 8.13 Identify conductors in complete accordance with the NEC and as indicated below. 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.
- 8.14 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:

120/208V SYSTEM

A-phase	Black
B-phase	Red
C-phase	Blue
Neutral	White
Ground	Green

277/480 V SYSTEM

A-phase	Brown
B-phase	Orange
C-phase	Yellow
Neutral	White with brown tracer(s)
Ground	Green

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

SECTION 16300 - ELECTRICAL MATERIALS

manufacturer's catalog), unless specifically indicated otherwise. Provide color as selected and approved by the owner and architect.

- 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), 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 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 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.
- 10.6 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.
- 10.7 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).

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

SECTION 16300 - ELECTRICAL MATERIALS

(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 unit to shut down VFD unit if safety switch is opened to prevent operating VFD without load connected.
- 11.5 Equipment as manufactured by ABB/GE, Eaton, Schneider, and Siemens (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 Eaton/Bussman. Equipment as manufactured by Mersen 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, Eaton/Bussman #LPN/S-RK series) or class "L" (over 600 A, Eaton/Bussman #KRP-C series). Class "CC" fast acting (Eaton/Bussman #LP-CC series) or time delay (Eaton/Bussman #KTK-R series) 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

SECTION 16300 - ELECTRICAL MATERIALS

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.
- 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.

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 ABB/GE, Eaton, Schneider, and Siemens (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.

SECTION 16300 - ELECTRICAL MATERIALS

- 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.
- 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 ABB/GE, Eaton, Schneider, and Siemens (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.

SECTION 16300 - ELECTRICAL MATERIALS

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.

<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.

SECTION 16300 - ELECTRICAL MATERIALS

17. DRY TYPE TRANSFORMERS

- 17.1 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.
- 17.2 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.
- 17.3 Provide with primary full capacity taps, a minimum of two (2) 2.5% taps above and two (2) 2.5% taps below rated voltage.
- 17.4 Provide coils of continuous wound construction impregnated with non-hydroscopic, thermosetting varnish. Provide copper or aluminum coil windings.
- 17.5 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.
- 17.6 Provide core visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable NEMA, IEEE, and ANSI standards.
- 17.7 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).
- 17.8 Provide the entire enclosure degreased, cleaned, phosphatized, primed, and finished with gray baked enamel.
- 17.9 Provide manufacturer guaranteed sound levels not exceeding 45 dB.
- 17.10 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.

SECTION 16300 - ELECTRICAL MATERIALS

- 17.11 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.
- 17.12 Equipment as manufactured by ABB/GE, Eaton, Schneider, Siemens, and Sola (or approved equal) shall be considered.
- 18. HAND HOLES
 - 18.1 Provide hand holes of minimum sizes as per the NEC to facilitate wiring, except where sizes are indicated on the drawings. "Hand holes" include underground boxes with all inside dimension (length, width, and depth) less than 1.2 m (4'0").
 - 18.2 Provide all hand holes of the pre-cast type, unless indicated otherwise. Provide all hand holes of only the pre-cast type where located in roadways, parking lots, areas subject to vehicular traffic, and for wiring over 600 V. Hand holes of the composite type are permitted for wiring 600 V and less in paved and unpaved areas not subject to vehicular traffic (except locations indicated above as requiring only the pre-cast type). Hand holes of the composite type are permitted in parking lots (and other locations indicated on the drawings or designated in writing by the engineer as limited to occasional non-deliberate traffic) only where one (1) or more of the following applies:
 - A. The center of the hand hole is located within 0.6 m (2'0") of a concrete lighting pole foundation, wall, or similar structure 0.6 m (2'0") or higher (i.e. excluding curbs).
 - B. Protective bollards installed for the purpose of protecting other equipment or apparatus protect the hand hole (installing bollards for the sole purpose of protecting a hand hole is not permitted).
 - C. The engineer approved the specific installation in writing.
 - 18.3 Provide all pre-cast hand holes as follows. Provide of reinforced pre-cast concrete cast with integral sump pit (slope floor towards pit), ground rod hole, recessed "break-out" wall sections to facilitate raceways, and pulling irons. Provide with at least one (1) pulling iron for each wall (locate at the bottom of the wall), unless indicated otherwise. Provide with the following:
 - A. Provide with round 0.75 m (2'6") diameter (minimum inside clear opening), vented (to facilitate escape of pressurized gasses), and heavy-duty AASHTO H20 full traffic loading rated frame and cover (cover weighing 46 kg (100 lb.) or more). In paved areas, set nominally flush with finished grade (set in such a manner to avoid damaging snow plows and other snow removal equipment). In unpaved areas, set 25 to 76 mm (1" to 3") below finished grade to facilitate lawn mowing and to allow for settling. Slope the frame and cover (provide floor as level) if necessary to match grade. Where necessary to facilitate finished grade, provide suitable grade extension ring (of either the pre-cast concrete type or field fabricated utilizing bricks and mortar) between top and cover frame.
 - B. Provide 19 mm (3/4") x 3.0 m (10'0") ground rod driven through floor. Bond all metallic objects, grounding conductors, cable shields, etc. to ground rod utilizing #6 AWG (minimum) copper ground conductors.

SECTION 16300 - ELECTRICAL MATERIALS

- C. Where the distance from grade level to the floor exceeds 1.8 m (6'0"), provide one (1) sign inside of each cover, plainly visible from grade with the cover removed. Provide warning sign as OSHA approved, conforming with CFR1926.21, with the wording "DANGER: Confined Space...", and with additional wording as directed by the owner (include costs for custom wording). Provide signs as 255 mm x 180 mm (10" x 7") minimum, semi-rigid plastic type.
 - F. Install and set on a smooth, compacted, and level base of not less than 155 mm (6") of sand or crushed stone according to manufacturer's recommendations. Install so all parts of the concrete top (excluding frame, cover, and grade extension ring) are at least 100 mm (4") below final finished grade. Any corner projecting above or within 100 mm (4") below grade is not acceptable.
- 18.4 Provide all composite hand holes as follows. Provide of composite fiberglass reinforced polymer concrete construction, heavy-duty open bottom type, capable of being stacked to form an overall deeper box, Hubbell/Quazite #PC* or #PG* series (or approved equal). Fiberglass reinforced polymer and structural plastic construction shall be considered where technical characteristics and structural ratings meet or exceed the specified construction. Provide rectangular (dimensions to match box) locking cover secured with "penta-head" bolts. Provide heavy-duty ANSI/SCTE 77 "Tier 22" loading rated hand hole and cover. Specifications are based on equipment as manufactured by Hubbell/Quazite. Equipment as manufactured by Hubbell/PenCell, Nordic Fiberglass, and Oldcastle/Synertech (or approved equal) shall be considered.
- A. Install in complete accordance with manufacturer's recommendations, including gravel/crushed stone under box (for drainage, as per manufacturer but not less than 155 mm (6") deep below box) for all locations plus concrete encasement ring (as per manufacturer but not less than 255 mm (10") wide and 255 mm (10") deep around box) where located in areas subject to vehicular traffic.
 - B. Install and set on a smooth, compacted, and level base of not less than 155 mm (6") of crushed stone (for leveling and drainage) according to manufacturer's recommendations. In paved areas, set nominally flush with finished grade (set in such a manner to avoid damaging snow plows and other snow removal equipment). In unpaved areas, set 25 to 76 mm (1" to 3") below finished grade to facilitate lawn mowing and to allow for settling. Slope hand hole if necessary to match grade.
 - C. Provide all raceways entering the open bottom of the box (locate to comply with the NEC), unless indicated otherwise. Where the quantity of bends in a raceway run does not facilitate entering the bottom of the box, raceway may enter the side of the box only where in accordance with NEC Article 314.28.
 - D. Where a ground rod is indicated on the drawings or otherwise installed, bond all metallic objects, grounding conductors, cable shields, etc. to ground rod utilizing copper ground conductors sized as per the NEC.
- 18.5 Provide all raceways with suitable bushings or bell fittings. Completely seal around all raceway openings (except raceways entering the open bottom of composite hand holes).
- 18.6 Utilize steel RMC only for all raceways entering pre-cast hand holes within 1.5 m (5'0"), except as follows. Where PVC RNC is permitted elsewhere, PVC RNC may directly enter

SECTION 16300 - ELECTRICAL MATERIALS

provided the PVC RNC is encased in a steel reinforced concrete envelope within 1.5 m (5'0") and the duct bank reinforcement is tied and interconnected to the pre-cast hand hole reinforcement.

- 18.7 Provide all covers with prominent and permanent factory cast marking describing the system use. Coordinate exact wording with the engineer based on the system involved (i.e. "ELECTRIC", "CATV", "COMMUNICATIONS", "CONTROLS", "FIBER OPTIC", "HIGH VOLTAGE", "LIGHTING", "STREET LIGHTING", "TELEPHONE", "TRAFFIC", "TRAFFIC SIGNAL", etc.).
- 18.8 Avoid splices and connections in hand holes as much as practical. Where splices and connections are necessary (including grounding connections), utilize only methods approved, identified, and listed as suitable for direct burial, underground, and submerged use. Submit shop drawings for all splicing, connecting, and terminating methods and materials to the engineer for review and approval. Where any splices or connections are made utilizing methods or materials which are not approved (in advance) in writing by the engineer, the contractor shall remove splices/ connections and install new splices/ connections as directed by the engineer (including replacing and/or reinstalling any wiring which is damaged, corroded, must be extended, or does not facilitate the directed splices/connections) at no cost to the owner.

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 schedule on the drawings for additional information.

2. DRIVERS AND WIRING

- 2.1 Completely coordinate exact lamp types (including configuration, dimensions, etc.), drivers, lighting fixture 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 proposed for use (multiple manufacturers and series are permitted, provided all drivers conform to the specifications). Where lighting fixtures are installed by the contractor which include drivers that do not meet the specifications (without prior written approval) the contractor shall remove drivers and provide new drivers meeting the specified criteria at no cost to the owner.
- 2.3 For lighting shown with 0-10 V dimming, provide with drivers to facilitate dimming. For all light types shown or specified with 0-10 V dimmable drivers (wherever 0-10 V dimming is indicated on the drawings [including lighting fixture schedule] or specifications), provide both power wiring and 0-10 V control wiring to all lighting fixtures. Run control wiring from all lights with 0-10 V dimmable drivers 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).

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, etc.), drivers, lighting fixture 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 lighting fixtures as indicated on the drawings. Provide all lighting fixtures with lamps (even if lamp types and/or quantities are not shown on drawings) to provide a complete installation.

4. LIGHTING FIXTURES

- 4.1 Provide lighting fixture types and manufacturers as indicated on the drawings. Where a lighting fixture type designation (i.e. letter) is not shown at a lighting fixture symbol,

SECTION 16400 - LIGHTING SYSTEM

include costs in bid to provide any applicable type of lighting fixture used for the same symbol anywhere else on the drawings.

- 4.2 Support all lighting fixtures (including outlet boxes and/or conduits used to support lighting fixtures, where permitted) in complete accordance with all applicable requirements of the NEC (including, but not limited to, code requirements for mounting and support of lighting fixtures, 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 lighting fixtures completely independent of suspended ceilings and direct from the structure (suspended ceilings are permitted to provide supplemental lateral support to lighting fixtures which are vertically supported direct from the structure. Supporting lighting fixtures with or from conduits or raceways is not permitted, except that lighting fixtures 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 lighting fixtures from screw shells of lamp holders is not permitted under any circumstance. Supporting lighting fixtures 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 lighting fixtures. Verify final location of all lighting fixtures 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 lighting fixtures.
- 4.5 Provide integral thermal protection for all recessed lighting fixture housings.
- 4.6 Perform aiming of all adjustable interior lighting fixtures. 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 lighting fixtures wired utilizing surface mounted wiring methods, provide wiring entering the side of lighting fixtures. 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.

5. EXTERIOR LIGHTING

- 5.1 All provisions of the section of this specification "General Lighting" apply to exterior lighting.

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.

SECTION 16400 - LIGHTING SYSTEM

- 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 lighting fixtures. 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 lighting fixtures), 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.

END OF SECTION

SECTION 16500 - FIRE ALARM SYSTEM

1. GENERAL

- 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, detection, voice alarm, and fire communications system work is indicated on the drawings and schedules. Types of fire alarm and detection equipment includes the following:
 - A. Control panel (with integral annunciation and voice and communications control)
 - B. Audio/visual speaker/strobes and visual strobes
 - C. Manual pull stations
 - D. Smoke, heat, and other automatic fire detectors
- 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 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 with voice evacuation and fire communications.
- 1.5 Equipment as manufactured by Edwards/EST/UTC, 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 documentation, and operation and maintenance documentation and instructions) during the project (specifically including where associated with changes to the scope of work,*

SECTION 16500 - FIRE ALARM SYSTEM

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.

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), 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) diagrams if required by local authorities having jurisdiction.
- 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.
- 3.2 The fire alarm riser diagram on the drawings is approximate as a general guide to system architecture and functioning. Provide exact quantities as specified (based on floor plan drawings, etc.).
- 3.3 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 initiates a "fire alarm" and activates all fire alarm signaling, output, and notification devices (including, but not

SECTION 16500 - FIRE ALARM SYSTEM

limited to, horns and strobes, door releases, and central station and fire department alarm notification).

- B. Trouble Alarm Activation: Any trouble conditions in the fire alarm system 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, except as specifically provided as follows).
- C. 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
 - 2) Trouble Alarm: Upon any "trouble alarm" condition.

4. MATERIALS, EQUIPMENT, AND DEVICES

- 4.1 **CONTROL PANEL, FIRE ALARM FUNCTIONS:** Provide fire alarm control panel surface mounted where indicated on the drawings and including the following items and/or features:

- 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 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.

SECTION 16500 - FIRE ALARM SYSTEM

- 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 CONTROL PANEL, VOICE/COMMUNICATIONS FUNCTIONS: Provide fire alarm control panel including the following voice/communications items and/or features:
- A. Pre-recorded evacuation messages using solid-state electronics
 - B. Voice evacuation system
 - C. Dual channel functioning
 - D. Speaker/telephone zone select switches
 - E. Audio amplifiers, including standby and backup amplifiers
 - F. Field recorded digital message
 - G. All call feature
- 4.3 COMBINATION SPEAKER AND STROBE ASSEMBLIES: Provide combination speaker and flashing strobe audible and 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 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 devices capable of NFPA compliant low-frequency (nominal 520 Hz) operation. 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 (78, 82, 84, 87, 90, 93, and 95 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

SECTION 16500 - FIRE ALARM SYSTEM

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 **SPEAKER ONLY ASSEMBLIES:** Provide speaker audible 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 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. Provide with adjustable output settings (78, 82, 84, 87, 90, 93, and 95 dBA). 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.
- 4.6 **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).
- 4.7 **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.
- 4.8 **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 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).
- 4.19 **SUPERVISORY AND CONTROL DEVICES:** Interconnect each supervisory and control device 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.

SECTION 16500 - FIRE ALARM SYSTEM

- 4.10 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.
 - 4.11 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) 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. Do not run other systems (including power, lighting, controls, telecommunications, etc.) in fire alarm raceways. 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

SECTION 16500 - FIRE ALARM SYSTEM

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.
- 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 local authorities having jurisdiction.
 - C. Suitably label (in an engineer and owner approved method) all addressable fire alarm devices (manual pull stations, smoke detectors, heat detectors, 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.

7. QUALITY ASSURANCE

- 7.1 Completely test the entire system as per "Testing" in specifications section 16100 "General Electrical". Perform the following additional testing.
- 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

SECTION 16500 - FIRE ALARM SYSTEM

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 two (2) full working days 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